NATIONAL CAR BUILDER

VOLUME XII. NUMBER 2.

DEVOTED TO THE INTERESTS OF RAILWAY ROLLING STOCK.

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FEBRUARY, 1881.

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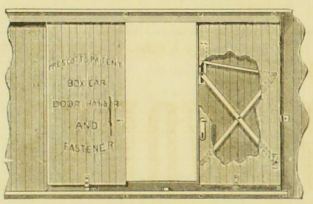

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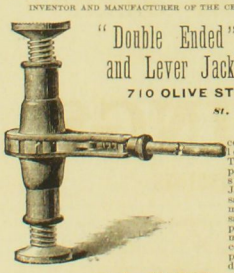

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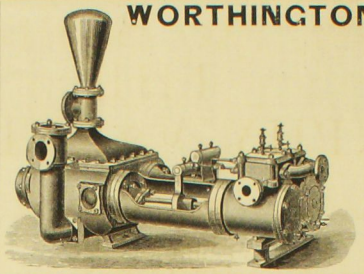

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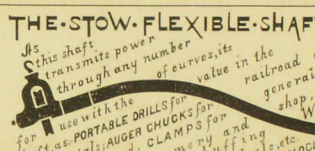

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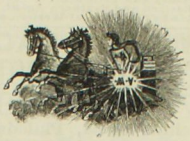

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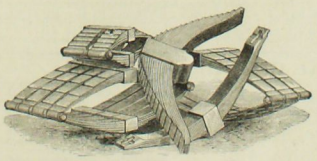
EXTRA TEMPERED,  LIGHT ELLIPTIC

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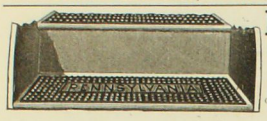

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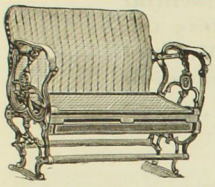

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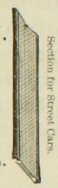

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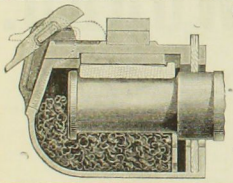

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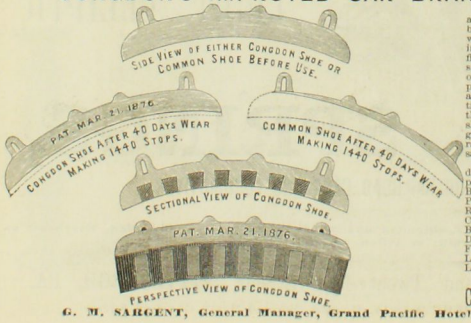

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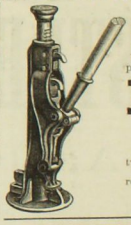

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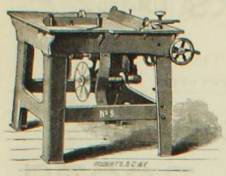

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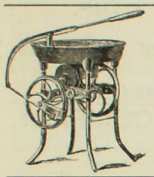

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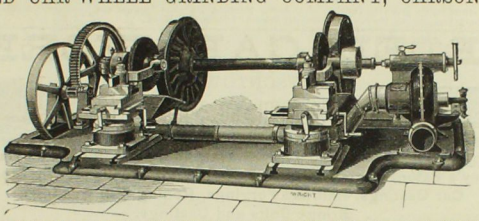

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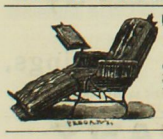

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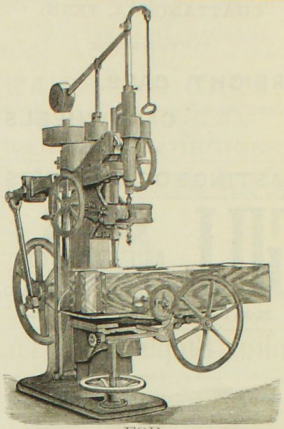

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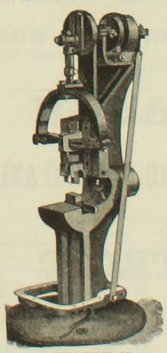

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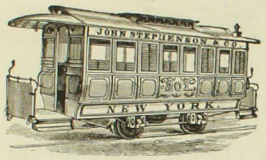

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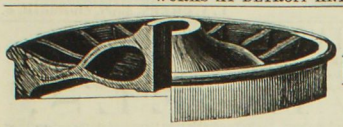

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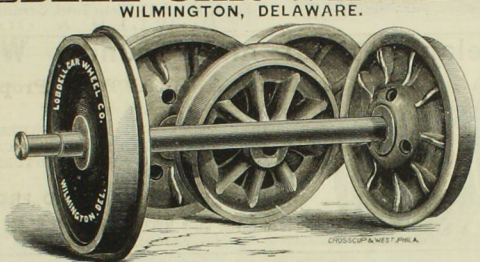

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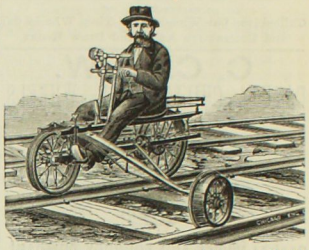

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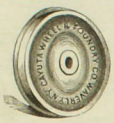

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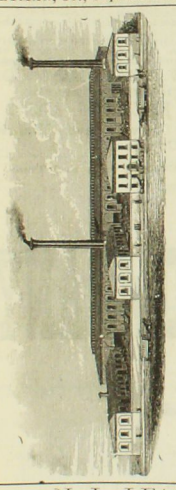

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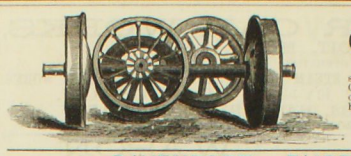

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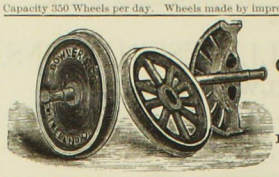

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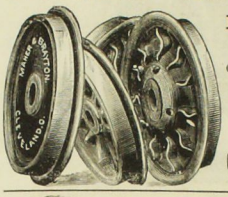

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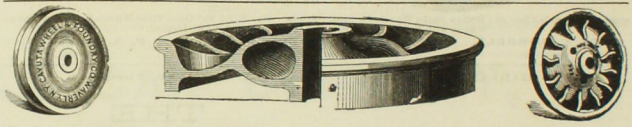

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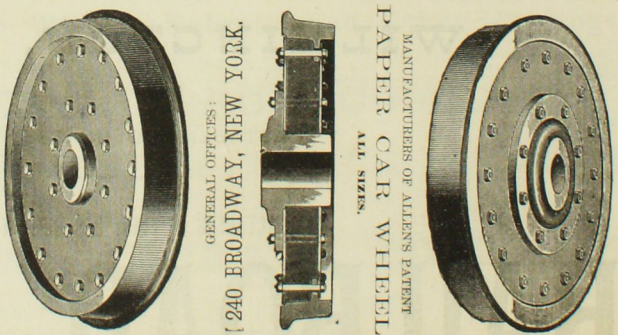

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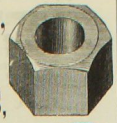

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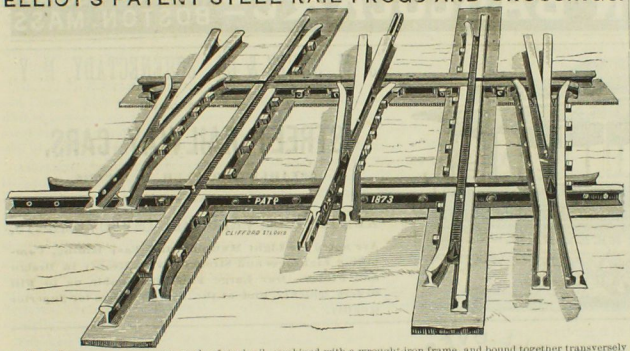

These Frogs and Crossings are made of steel rail, combined with a wrought-iron frame, and bound together transversely with strong bolts, which give it great strength and durability without destroying its elasticity. They are connected at all ends by Fish-Plate Joints, and lie on the same tie surface as the running rail without any cutting of ties, thus saving a great deal of time and labor in putting in place in track.

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STEEL CASTINGS,

From ½ lb. to 20,000 lbs. weight.

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Locomotive Cross-Heads, Links, Rocker-Arms, etc., etc., and suited for Passenger and Freight Cars.

SPECIALTIES.

Propeller Wheels, Crank Shafts, Hydraulic Cylinders, Large and Small Gearing and Pinions, etc., etc.

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ESPECIALLY PREPARED FOR

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THESE LEATHERS ARE WELL ADAPTED FOR

Panel and Ceiling Decoration,

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FINEST PALACE CARS.

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CHARLES R. YANDELL & CO.,
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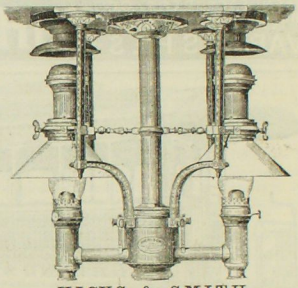

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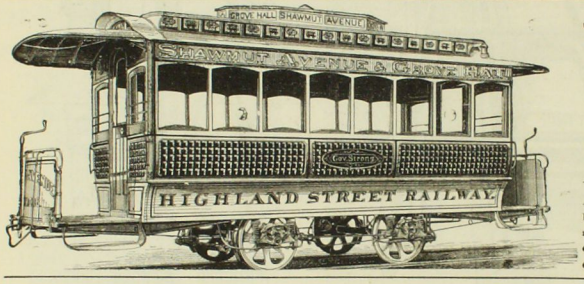

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Are noted for Light Running and Easy Riding, Combining Lightness and Strength with Beauty in Design and Finish. Our Large Facilities enable us to Fill Orders Quickly, and at the Lowest Prices for Superior Quality.

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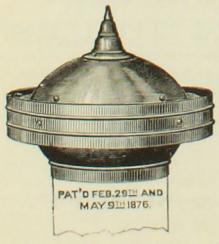

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Twenty-five Sizes, from 2 in. to 48 in. inclusive.

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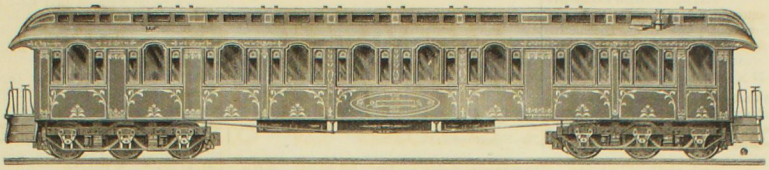


DEVOTED TO THE INTERESTS OF RAILWAY ROLLING STOCK.

VOLUME XII. NUMBER 2. | FEBRUARY, 1881. | SINGLE NUMBERS, TEN CENTS. $1.00 PER ANNUM.

Miscellaneous Items.

THE Adrian (Mich.) Car Works, under the management of Superintendent James Miller, have been greatly improved. The old buildings have been thoroughly repaired and new ones erected. The present force of 200 men is employed on a contract for 100 flat, 50 coal and 50 box cars for the Indianapolis, Peru & Chicago road. The coal cars are 30 feet long by 9 feet wide, and weigh 16,000 lbs.; the box and flat cars are 33 feet long and 9 feet wide. The working force will soon be increased to 300 men, the company having contracts that will keep the works employed for five or six months.

MR. F. P. MOSELEY, Purchasing Agent of the Old Colony Railroad and Steamship Companies, died at Boston, Jan. 8, aged 54 years. He was an excellent citizen and business man, and his death will be widely regretted.

AN English paper predicts that wooden railway sleepers are to be replaced by steel, just as iron rails are being superseded by steel rails. Steel sleepers, it says, are very flexible, and will outlast the toughest rails, while their greater cost over timber sleepers will be compensated by their greater endurance, and the diminished expenditure of relaying. They are now manufactured in great quantities at Düsseldorf, and 70,000 tons have been laid down as an experiment in various parts of the continent.

THE new grain elevator of the Pennsylvania Railroad Co., at Jersey City, was opened for business Jan. 10. It has a storage capacity of 1,500,000 bushels, with ample facilities for receiving from cars and delivering to vessels. There is track room for 48 cars, one-half of which can be unloaded at one time, while the other half are being placed in position. The most ample provision has been made to protect the building against fire.

IT is said that the street cars propelled by the wire-cable system in San Francisco run quietly and do not scare horses. This is doubtless because the 'Frisco horses have got used to the quiet movement. It is different with the truck and market wagon steeds that throng Greenwich street here in New York. Should a train on the elevated road undertake to come along quietly, these animals would snort, turn their feed-bags bottom end up, and, with tail, heels and head erect, start towards Jericho in wild affright at the unwonted phenomenon. They are accustomed to *noise*.

THE Phosphor-Bronze Smelting Co. (limited), of Philadelphia, has recently moved its offices to 512 Arch street, of that city, in connection with which a sales and show room has been opened for the exhibition of the numerous products manufactured by the company.

AN electric head-light for locomotives will soon be tried on the Cleveland & Pittsburg Railroad. The power will be furnished by a small engine placed behind the smoke-stack, and furnished with steam from the main boiler.

DURING last year, the Ohio Falls Car Company built 4,850 cars, as follows: Box, 3,500; stock, 250; flats, 659; mail, passenger, caboose, etc., 100; coal, 350. The company paid out $245,000 for labor, and at present there are 1,400 men on the pay rolls.

MR. JOHN BURNHAM, the engineer on the Shore Line to New York, who stopped his train in the face of extreme danger recently, has been presented by the patrons of the road with a gold watch and chain valued at $500, as a token of their appreciation of his bravery.

THE work of niching the Hoosac Tunnel preparatory to laying a double track has begun. These niches will consist of small recesses cut out of the side of the tunnel to enable workmen to have a place of safety for themselves and their tools while working in the tunnel after the double track is laid. These recesses will be 200 feet apart, $3\frac{1}{2}$ feet in depth, 8 feet high and 6 feet wide. At an interval of every 300 feet a larger niche will be built, the dimensions of which will be 10 feet in depth, 12 feet high and 8 feet wide. These are designed for construction hand-cars and the larger apparatus used in constructing or repairing the tracks and the interior of the tunnel.

THE heaters used on the New York Elevated Railroads consist simply of pipes extending the entire length of the cars. They are coupled from one car to the other by means of rubber hose. The average amount of steam, supplied, of course, by the locomotive, is at a pressure of 25 pounds. This is regulated by a small "pop valve" arranged in the hose under the rear platform of the last car. When the steam reaches any pressure over the desired amount the valve is raised and allows it to escape, thus protecting the hose from bursting when the pressure becomes too great.

AN engineer on one of the Indianapolis roads, who prides himself greatly in economizing fuel, recently remarked that his success was in a large measure due to the fact that he broke his block coal up as fine as nut coal before using it, and that by this method he could get 20 per cent. more steam out of a ton of coal than by burning it as it comes, regardless of its size. Another part of his statement was that his fireman paid special attention, when throwing fuel into the fire-box, to drop it where it is needed, the secret of firing successfully being to have an even fire all over the fire-box.

THE Wagner car shops, which were started last November at Niagara Falls, have been doing considerable work lately. Three cars have been rebuilt and two more will be finished in a few days. Four sleeping cars are being completely overhauled, repainted and refitted. These shops were started at the falls to relieve the Albany shops, and more particularly to do the work for the western division.

A STATE-ROOM car is being constructed at the Aurora shops of the C., B. & Q. road which will cost $15,000. It will run between Chicago and Omaha, in order to test its popularity with the traveling public.

THE Cleveland Bridge & Car Works are turning off 55 cars weekly on a contract for 500 cars for the Tuscarawas Valley road. When this contract is filled they begin on one for the Cleveland, Columbus, Cincinnati & Indianapolis Railway for 300 cars. They are also making a large number of iron bridges for the latter road, of remarkable weight and strength, to correspond to the increased weight of engines now coming into use.

SEVERAL monster freight locomotives are in process of construction for the New York, Pennsylvania & Ohio Railroad. They rest on six drivers and a four-wheeled truck, and will weigh 88 tons, empty. Trainmen are considerably troubled by their trains breaking in two when hauled by these powerful consolidated engines, and the only remedy seems to be heavier draw-bars, links and pins.

THE New York, Pennsylvania & Ohio Co. is about to increase the capacity of its machine shops at Salamanca. The working force is to be increased, and new machinery and other improvements added.

WHAT is known as the "Cannon-ball Line," the Omaha and St. Louis express of the Wabash, St. Louis & Pacific road, made the fastest long-distance run on record in the West one day last week. It ran 186 miles in four hours, and made ten stops. Allowing three minutes for each stop, this would make the actual running time at the rate of 53 miles per hour.

THE Cairo & St. Louis Railway Co. have just had built 150 new box cars, which have a capacity of holding 125 barrels of flour. These cars are larger than those usually made for narrow-gauge railways, and, as will be seen, can carry as many barrels of flour as the box cars of the standard-gauge roads.

MR. H. N. E. COTTIER, Master Mechanic of the North Chicago City Railway Co., has built an open street car with revolving seats, so that passengers can always face to the front. The posts, and rafters in the roof are so constructed that the blinds, when raised, run up into the roof and form an ornamental panel ceiling. These blinds are made of canvas, to which are glued and riveted narrow, slats. A new style of pedestal is also used, which does away with cross-braces and makes the car lighter. The iron work is nickel plated.

THE new Fontaine friction-driver locomotive appears to be a success, if a correct opinion may be formed of its merits from its reported performances on the Toledo Division of the Canada Southern road. Its pulling capacity is said to be superior to that of any of the standard engines. During the extreme cold weather a few weeks ago it pulled a train of 38 loaded freight cars over the division in quicker time than was ever made before under the same circumstances. It makes from 175 to 250 miles daily, and also effects a considerable saving in fuel. It has recently been supplied with a new and improved truck, with which it has been run at a rate exceeding 60 miles an hour. If this

unique machine keeps on in this way, it will upset the prevailing notion that the standard locomotive construction is already so perfect as to admit of no essential improvement. The Grant Locomotive Works are to build two more of these engines. They are to be somewhat heavier than the first one, and will have 17 × 24 inch cylinders.

MR. THOMAS CLARK, of Truro, Nova Scotia, the inventor of an improved live stock car, reports that one of his cars loaded with 16 steers made the trip in very cold weather from Chicago to Boston in five days, including sundry delays caused by waiting for other feight—the train being a mixed one. The animals consumed during the trip 75 cents worth of hay per head, and their shrinkage in weight was less than 8 pounds per head. They were at first a little restless, but soon became as contented as if they were in a barn. At one time all but two of them were lying down. The car is only 32 feet long inside, but the animals are loaded systematically, and every inch of room is occupied to the best advantage. So says Mr. Clark. Yet we do not quite understand how he manages to utilize the space so well. If fourteen of the steers can lie down and rest and chew their cuds, we suppose the whole 16 can do the same, and this with only an average space for each lengthwise the car, of 24 inches. This seems barely possible provided the cattle are a little under size.

THE Ohio Falls Car Co., Jeffersonville, Ind., has just completed a directors' car for the Minneapolis & St. Louis Railway Co. Notices of this car in the local papers represent it as handsome, magnificent, a thing of beauty, the finest palace car ever built in the West, furnished with all the latest improvements, admired and praised by all who have seen it, and so on. Citizens of New Albany, Jeffersonville and Louisville were invited to inspect it, and were treated on the occasion to a tempting lunch, enlivened by the popping of champagne corks. The prevailing sentiment was, that Mr. Sprague, the President of the company, had reason to be proud of such a superb piece of work. Of the dimensions of the car, details of construction, style of finish, ornamentation, heating and ventilating apparatus, trucks, brakes, etc., we have no information; but that they are all first-class is evident, otherwise it would be difficult to account for the "popping of the champagne corks."

THE cars of the Metropolitan Underground Railway, of London, are divided into two compartments, each containing two seats, which extend the full width of the carriage and face together. A seat accommodates four persons. Compartments are marked on the door the class to which they belong. Doors are on each side of the carriage, those on the platform side only being opened. We can see that cars of this construction admit of very rapid exchange of passengers, an important consideration where stations are frequent. The bell rope from the engine is carried along the outside of the carriages within reach of the passengers by lowering a window. Brakes are not applied throughout the train, but at the guard's van, a car well adapted for the purpose, and which carries more or less ballast in the shape of luggage. The nearest approach to a conductor is in the person of the guard. He starts the train by waving a green flag, and closes the compartment doors as the train gets under headway, jumping into his own van at the end of the train. The destination of the trains is indicated by an ingenious arrangement of head-lights on the locomotives. One, two, or three lights are displayed, and in their various positions one may identify any train.

THE Maine Central road has lately ordered six new passenger and 100 freight cars.

A NEW company has been formed at Conshohocken, Pa., for the building of freight cars.

Western Railroad Association.

The report of the executive committee of this association for 1880 is a lengthy and interesting document. Its operations during the year have been harmonious and successful, and attended with advantageous results. Its functions are not to determine the *mechanical* merits of patented improvements pertaining to railroads, but questions of liability incurred by the use of patentable devices. The report says:

"One of the standing rules of the Association is that no new device, appliance or process shall be introduced and no change made in those already in use without a prior examination as to what possible patent liability may be incurred thereby. If there has been in years past a disposition on the part of any of the members to disregard patent property in all instances and to recognize the same only when forced to do so by a decree of court, this disposition has entirely passed away, and has been succeeded by a desire to encourage invention in all proper ways, to respect all legal patent rights, and to avoid difficulties of infringement by ascertaining in advance what property rights exist under the patent laws upon any device or combination proposed to be introduced, and by purchasing full rights thereunder in advance. While through inadvertence and a misunderstanding of the rule by the officers of some of the railroads composing the Association, requests for such examinations and opinions are not made in every instance, they are growing more frequent each month, and it is matter for congratulation that the rule is adhered to as uniformly as it is, and that the recommendations made to the members in this regard have been followed, so far as we know, in every instance."

In regard to the encouragement of invention by railroad employés, the following rules are recommended, and their strict observance requested:

"1. That all employés shall be encouraged to make and suggest improvements under the supervision of the heads of the respective departments; but that no change whatever shall be experimented with or introduced without the consent of that officer of the company who is the correspondent of this Association.

"2. If the improvement made or suggested shall commend itself to that officer, he shall submit the same with a model thereof immediately to the Association, with a request for a report as to whether the same or any part thereof be patentable, and as to whether the use of the improvement in part, or as a whole, would infringe any existing patent. This examination and report will be made without any other expense to the company making the request than the cost of a model of the improvement. We are forced to require this model in every instance for many reasons, and especially insist that the model shall be *in strict accordance with the device as it is proposed to be introduced*. It has not infrequently happened that a fraud has been perpetrated by submitting *a patent* to the Association for an opinion when the patentee intended to introduce a modified device to which the opinion given would not be applicable, and in some cases models have been submitted, and changes subsequently made in the device without submitting the changes so made for an additional examination.

"3. If it appear that the improvement, or any part thereof, be patentable, the railroad company whose employé makes the same, should for him, and through proper parties, take out the patent, paying the expenses thereof, the patentee (employé) in consideration thereof to execute to the railroad company a full and complete release and license, but otherwise retaining the title to the improvement. Great care should be exercised in selecting the solicitor to prepare the applications for such patents, for there are many solicitors of patents offering to do work of that kind for very small fees who are wholly unqualified for the business. It is well known that a majority of the patents issued from the Patent Office are either insufficient, inoperative, or invalid.

"The United States Patent Office has issued 165,393 patents since 1865, or an average of 11,812 per annum for 16 years, there being on the 1st of Dec., 1880, 197,793 still alive.

"During the year 510 opinions have been given; 78 new letters patent have been reported upon; 89 suits have been defended; claims aggregating an alleged liability on the part of the members of over five million dollars have been settled; fifteen companies have joined the Association; nearly four thousand letters have been written; sixteen applications for the extension of letters patent by Congress have been defeated, and some important precedents concerning the questions of the liability of manufacturers to their venders for patent royalties paid by the latter have been established—the expenses of the year being $343.59 less than for any year since the reorganization in 1874, and $907.23 less than for the year 1879."

In regard to the liability of manufacturers and supply agents to railroad companies for patent royalties, the following rules are submitted as being in accordance with established usage and equity:

"1. That if the railroad company specify any article by its patented name, the manufacturer may take it for granted that the railroad company has the right to use the same and that the manufacturer will be protected by the railroad company in the manufacture. This has been settled by custom, and in such cases the manufacturer will hold the railroad company justly liable, though perhaps he could not legally, unless it be specially provided in the contract that the right to make and use the articles so named shall be purchased by the manufacturer as a part of his contract.

"2. If the manufacturer desires to introduce an element or device into the car or locomotive which is not specified, and which forms a part of his standard, and concerning the patent relations of which he is in doubt, he may, through the company giving the order, refer the question to this association, which will give to the company and to him safe advice in the premises, but

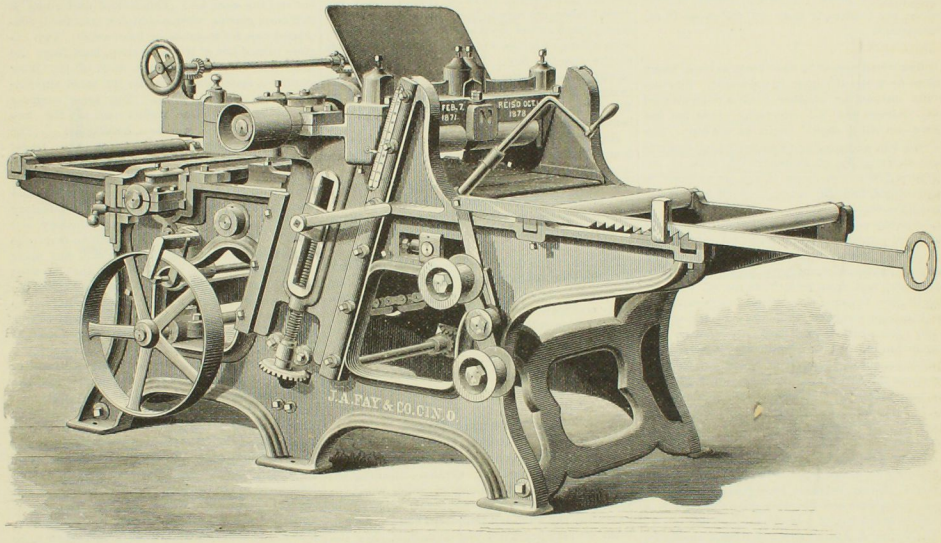
"3. If the manufacturer, without any advice to or from the association or the company and entirely on his own motion and without any specification therefor from the railroad company, puts into the car or locomotive a device against which a patent claim is subsequently made, we propose that the manufacturer shall, according as it may be determined by the association, either settle the claim or pay the expenses of a defense of the claim, which defense shall be conducted by the association, if it so determine.

"The questions of liability, as between the manufacturers and the railroad companies, for infringements of patents herein referred to, are involved in great uncertainty. We believe that they can be equitably settled without resorting to litigation. It is, of course, far preferable that these questions should, if possible, be determined without legal controversies. To secure adjudications by the court of last resort, which would authoritatively settle the questions involved in the three comprehensive rules reprinted above, would require many cases and a long litigation. To determine these questions without litigation *requires concert of action by the railroad companies.*

"It seems, therefore, both possible and proper that these questions be determined by and through this association, in accordance with the above rules, until it shall be demonstrated that they are insufficient or inequitable. We are also confident that nearly, if not quite all, the manufacturers and

supply-agents, acknowledging the fairness which has characterized the administration of the affairs of the association, will accept its determination of these questions under these rules; and we are sure that that will be the result, if the members of the association will uniformly acquiesce in the recommendation which we repeat, viz.: that they shall buy their supplies of those who will protect them in the use thereof, and will not, under any circumstances, purchase either from those who do not furnish this protection, or from those who we find have not the right to furnish the articles offered."

A NEW boiler and locomotive shop is to be started at Schenectady, N. Y., which will give employment to 1,000 men.



IMPROVED DOUBLE CYLINDER TRAVELING-BED SURFACING MACHINE.

THE engraving illustrates a revolving or traveling-bed planing machine, known as the Farrar planer—the maker's name still adhering to it—which, by its general use, indicates a popularity not yet exceeded by any other method of planing lumber, to which it is specially adapted. In surfacing lumber it is said to have no superior in speed and quantity of product; and, where large quantities are to be dressed, more can be done by the same expenditure of power than by any other method of construction. The single cylinder traveling-bed planers are universally known among lumber manufacturers, their merits having been tested by the most expert operators.

The machine, as shown in the cut, has recently been perfected and brought out by the well-known wood-working machine builders, J. A. Fay & Co., of Cincinnati, Ohio, and is attracting much attention among lumber men. Its peculiarity consists in its capacity to plane one wide or two narrow boards of equal or unequal thickness simultaneously, thus greatly reducing the cost of dressing one or both sides of lumber.

The machine has two cylinders, one for dressing the upper and the other the lower surface of the board, as it is passed through. The feeding power is conveyed to the revolving bed, constructed of heavy iron slats or rolls, flexibly connected by links or hinges to the slats, which are carried in the direction desired by a toothed wheel upon a shaft properly geared to regulate the movement of the lumber. The bed moves over slats placed in a position to produce an even wear upon the surfaces, and as little friction as possible, considering the friction of the rollers, which are placed on each side of the upper cylinder.

The rollers receive their pressure from heavy involute springs regulated in the passage by screws. The roller before the cut is divided in its center, forms two rollers, and is termed a broken roller. They are supplemented by a divided pressure-bar which also forms a most effective chip-breaker. This arrangement of the initial roller and the pressure-bar is of vital importance, as it enables the operator to feed in two boards of unequal thickness at the same time, thus equalizing the wear of the machine and almost doubling its capacity, from the fact that one board can be fed in where the divided roller and pressure-bar are not used. The upper cylinder, with its roller and pressure-bar, is raised on an angle to retain the proper function of the belts by two screws operated by connected gearing. The pressure-bar over the under cylinder also moves up with the upper cylinder, and is swung on hinges so as to be easily removed when access to the upper cutter is necessary. It has also a separate adjustment to regulate the pressure. The bed and under cylinder are upon the same plane, and stationary, so that when the adjustments are made for different thicknesses of lumber there is no difference to be made for the height of the feeding-in table. The lower cylinder has an independent adjustment to regulate the thickness of the cut taken from the lower side of the lumber. Both the end of the machine and the pressure-bar over the lower cylinder are hinged, and can be swung entirely out of the way without the necessity of removing bolts, for convenience of sharpening the cutters or removing the lower cylinder.

There are several patents on the machine, the last two being issued October, 1878, and April, 1879, respectively. It is guaranteed by the above-named firm to have a capacity of dressing 50,000 to 60,000 feet of lumber per day. For further particulars they may be addressed as above.

A Foe to Horse Car Ventilation.

A writer in the Boston *Transcript* says: The old-fashioned horse car, which really merited the name of "box," was ugly, was not spacious, and was not resplendent with engraved glass and variegated wood, but it was a box and not a sieve, as are the cars of to-day, and one could ride in it without periling one's life, which is more than one can do in the monitor-topped and brilliantly lighted vehicle that has succeeded it. Ventilators are good things, and one rejoices to see them everywhere. Some sitting-rooms have two, occupying together about 72 square inches of wall space; some public halls have a score, set 20 feet above the heads of the audience; horse cars have about two dozen, which occupy about 400 square inches, and they are set a foot above the heads of standing passengers, and a yard above the smiling countenances of the small minority which sit, each with a fine cool breeze blowing behind his shoulders from the window ventilator, and occasionally shivering a little when the doors are kept open unusually long. One corporation even improves upon this state of things, and refrigerates its patrons by substituting perforated wood for cushioned backs to the seats, so that the patient, that is to say, the future patient, sits in a perfect air bath. It is true that market baskets containing onions, men who have been smoking pipes, men who have been drinking ale, and women who use musk, are packed closely into the cars, and that the air would be impure were it not for the ventilators, but it could not become very poisonous in the short intervals between the entrance and departure of passengers if there were no ventilators at all, and its icy coldness makes it positively injurious to persons who are even moderately sensitive. The platforms are undeniably

cool, but they are far less dangerous than the interior of the car, with its complicated draughts and pretense of shelter.

Wanderings of a Car-Wheel.

I am a Car-Wheel.

Of humble origin, being born of mother earth, and making a virtue of being a hard case, my softer heart and perfect form are my commendable qualities. Although moving in a lowly station, I sometimes climb the heights and feel the glow of inspiration.

As I go about the world, across its plains, through its valleys, threading its rivers, around its hills, over its mountains or under them, I visit many towns and cities and their busy shops, see many people, hear many things, and so can take many notes, some of which I hope will interest and entertain my readers, if they will follow me in my wanderings.

I.

I first found myself in New York, a city of many claims upon the attention of the world. Whether it was instinct or whether I am a re-incarnated soul, I cannot say, but something made me feel that a car-wheel should begin at the hub. This will explain why my first move was to roll towards that ancient City of Boston, "The Hub of the Universe," where so many things are supposed to begin aright, and why I ran there without tarrying by the way.

It was my very good fortune to be in the train composed principally of the beautiful new Boston and Albany passenger cars. A railroad man who has traveled by rail from Nova Scotia to Southern California, and from New York to St. Paul by way of New Orleans, was sitting comfortably in his drawing-room chair, evidently considering that it did "*feel* a little better" than any other he had ever ridden in, for I heard him say, "this is the most luxurious car, as well as the finest train, I have ever traveled in; and it is very creditable to the best patronized passenger route in the country." From him I learned that they carry an average of over a thousand passengers each way every day.

At New Haven, the stop was so short and the lunch-counter in the depot so inviting, that before I could choose between fresh-poached eggs on toast, hot oysters and the other good things, I had to take a lunch-box of cold chicken and run on.

The Boston & Albany depot at Boston was finely illuminated with the electric light, whether for me, for some celebrated person, or for the benefit of all, I will not say, but I took the bright reception as a good omen.

II.

Being young myself, and feeling the deference due to age and experience, I made my first visit to Mr. John Lightner, master car-builder of Boston & Providence Railroad, who is supposed to be the oldest car-builder in the country. He has been in the B. & P. car shops nearly 47 years. He is building some new freight cars without trussing the body bolster as he has done for over 35 years. He promised to send you a description of his method with drawings. Some of these new cars have a door at the end, running from the corner to the centre, for the convenience of carrying extra long lumber, iron or other freight. The side doors on all are hung with Prescott's patent hangers.

This company has two combined smoking and baggage cars on 42-in. wheels. They weigh 24 tons, and the sills are 60 feet long. They ride easy and are doing acceptable service.

They have six 8-wheeled freight and express cars equipped with the Miller platform for running in express trains. These cars have four old steel rails in place of the wooden sills and floor-timbers. These and their other box and flat cars, built with old rails for sills and floor timbers, continue to make a good record for economical service and carrying heavy loads.

Their last novelty is a 4-wheeled express car with the Miller platform, which is used in their fast express train. Its body is 12 ft. 6 in. long, and it is 15 ft. 8 in. over all. The sills and floor timbers run the whole length. It works satisfactorily.

III.

AN IMPROVED TIP-CAR.

There I saw an improved tip-car, designed by Mr. Geo. Richards, Supt. of Motive Power, B. & P. R. R. Instead of draw-timbers, he uses two channel-iron beams, between which the draw-bars and their springs are attached by some special castings. They also serve to stiffen the frame and prevent its springing up in the middle where the draw-timbers are sure to break in a collision. The beams are 6 inches deep and $\frac{5}{16}$ of an inch thick, with a flange 2 inches wide. They weigh 11 pounds to the running foot. They are separated sufficiently to permit the draw-bars to be placed between at the standard height—an improvement on the ordinary timbers, which carry the draw-bars below the line of the other freight cars.

He has used old steel rails in place of this channel-iron in a number of tip-cars, and with the same advantages.

He also uses a piece of old steel rail slightly curved and inverted, for a rocker-bed in place of a rocker-bearing and timber. They are not so likely to bend as wood, and, like the iron beams, will not rot.

Just when the draw-timbers are rotten enough to be unsafe is so difficult to determine, that it is often not found out until one breaks and makes a costly accident.

These improvements have removed so many of the objections to the tip-car that it is coming again into more general favor. Mr. Richards patented his device in 1873, and it is now used by most of the New England railroads.

IV.

SPURR'S PAPERED VENEERS.

At 522 Harrison avenue, Boston, is the manufactory of the Spurr paper veneers. These veneers can be used for surface finishing in place of the ordinary veneering, solid woods or wall paper, and are being extensively applied in decorating the walls and ceilings of houses, and as a finish on pianos, organs and furniture. For the ornamentation of railway passenger cars they afford an endless variety in plain and figured woods, marqueteries and pictures, and are both handsome and durable. Portraits, landscapes, and designs of every kind can be printed on light woods and finished to endure as long as the wood lasts. They can be applied to the inside of a car frame without sheathing, by the use of a rubber sheet which is attached, not to canvas, but to a fine wire cloth, which is proof against shrinkage, stretching and dampness.

These veneers can be washed with soap and water, or cleaned in any way that solid woods can be. They are so very thin—only from $\frac{1}{50}$ to $\frac{1}{75}$ of an inch in thickness—that the wood loses its power to contract, so that it is not affected by heat or moisture, and will not shrink, warp or crack, as has been tested by nine years' experience.

In this establishment may be seen the handsomest natural woods in every form, from the green log to a finished column which an expert mistook for variegated marble. A description will hereafter be given of the method of preparing and applying these veneers.

Mr. Spurr is now preparing a design for the headlining of a car, which we hope to see illustrated in a future number of the CAR-BUILDER.

Individual Character in Machines.

All mechanics of an extended experience are aware that there is no rigid uniformity in machines or implements, even when made on the interchangeable plan. It may be said, further, that uniformity or equality is the exception, and dissimilarity the rule. Perhaps, in some cases, identity of result is very nearly approached, but the closer the uniformity desired, the more apparent are the differences. One would think that so simple a machine as the sewing machine might be produced indefinitely without variation, but it is not so. If it was so, why is it that a woman who has run one particular machine for months, producing excellent work and seldom meeting with an accident, boggles and bungles, breaks needles and spoils work when transferred to another machine of the same build, the same number and the same lot? This lack of uniformity is still more glaring when a complex machine is considered—as, for instance, a locomotive. Two engines turned out of the same shop, built from the same patterns, by the same men, of the same quality of materials, and under the same superintence, do unequal work. The same engineer cannot get the same results out of the two machines under similar conditions. The exactness of result required of the target rifle is a forcible illustration. The experienced shot does not send to the manufacturer an order for a rifle of a certain calibre and weight, feeling certain he will get a satisfactory gun. If possible, he visits the manufactory, and patiently tests piece after piece, until he finds one to his mind. A marksman, whose skill has made him famous, stated, some time ago, that he went three times to a certain rifle factory, and tested the guns of three different lots before he found one to his liking; and yet each rifle of the same calibre was to all outward appearance the counterpart of the others. In what consisted the difference?

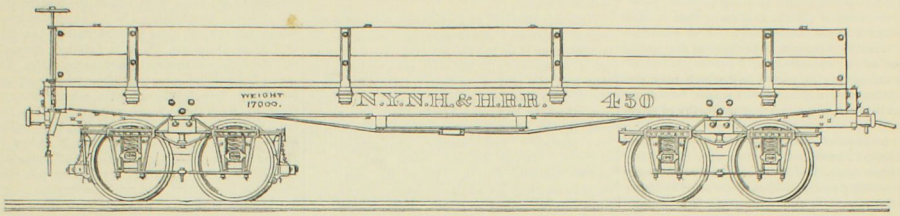
It would be folly to make a mystery of this fact; it would be greater folly to deny its existence. The whims and tempers and oddities of the workmen cannot be solidified and perpetuated in the metal or other material. It is scarcely competent to charge the machinery with the faults of the finished article. The differences known to exist in the metals, even in "homogeneous" cast iron, may account for the differences in the product of their make-up, and something must be allowed, also, for the imperfections of the workman. When the production of steel and iron and compound metals ceases to be—as it is—a series of experiments, and the exact result can be predicated of the cementation even, the crucible, the cupola and the furnace, these at present unaccountable differences in the behavior of the manufactured machine or tool or implement will disappear or be reduced to a minimum.—*Boston Journal of Commerce.*

A WRITER who has devoted some attention to the decorators and artisans of Japan, says that the worker in metals is, without exception, the most artistic; but that all Japanese workmen and artists discard utterly the happy-go-lucky method in their work. They undergo a thorough training in ancient custom and precedent. Hand-books with elaborate instructions and progressive lessons are cheap and accessible to the poorest, for circulating libraries abound. From first strokes to the finished drawing, and for each class or style of design, there are many elaborately illustrated works of reference.

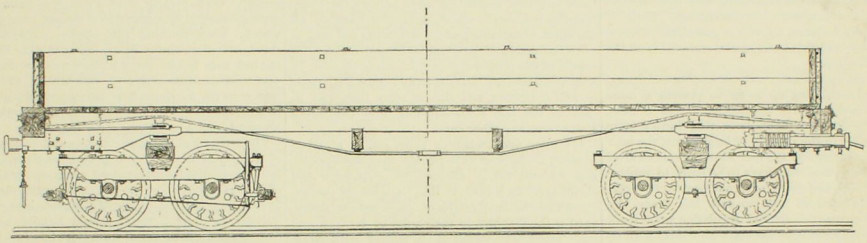
To remove old paint, slake three pounds of stone quicklime in water, and add one pound American pearlash, making the whole into the consistence of paint. Lay over the old work with a brush, and let it remain from twelve to fourteen hours, when the paint is easily scraped off.

STANDARD GONDOLA CAR—NEW YORK, NEW HAVEN & HARTFORD RAILROAD.

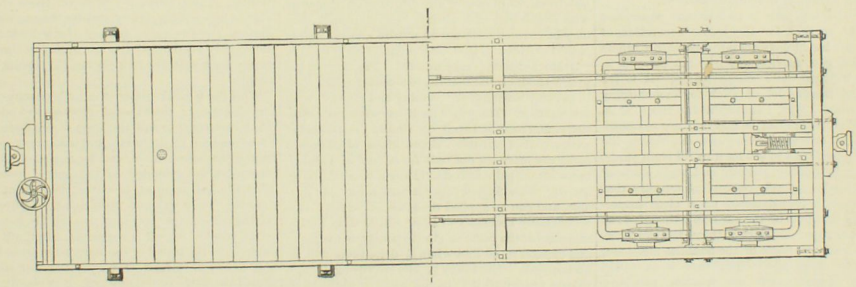
Built at Hartford Shops: Loren Packard, M. C. B.



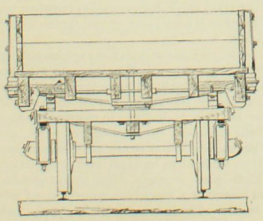
Side Elevation.



Longitudinal Section.



Floor and Floor Frame.



Transverse Section.

GENERAL DIMENSIONS.

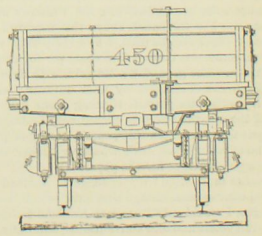
Total length of frame				28 ft.	9 in.
Total width of frame				8	0

BODY TIMBERS.

Side sills	So. pine	5×12	in. ×	28 ft.	0
Center stringers	" "	4×8	in. ×	28	0
Intermediate stringers	" "	4×8	in. ×	28	0
Flooring	" "		1⅛×8		2
Stakes	wh. oak	4×4	in. ×	2	10
Buffer blocks	" "	5×11	in. ×	2	6
Draught timbers	" "	4½×9½	in. ×	5	8
End sills	" "	5×11	in. ×	8	6
Cross beams	" "	4×9½	in. ×	8	0
Side boards	spruce	2¼×24	in. ×	28	0
End boards	"	2¼×24	in. ×	8	0

Iron body bolsters.
Trucks, same as used under box cars.

Average weight of car	17,000 lbs.
Carrying capacity	38,000



End Elevation.

Communications.

A New Style of Inside Finish for Passenger Cars.

To the Editor of the National Car-Builder:

I am a constant reader of your valuable paper, and have noticed articles in it from time to time in reference to the ornamental finish of passenger cars. Having had much experience in this special feature of car construction, I venture to submit some suggestions in regard to it which may perhaps seem new and novel, but which, I trust, are not on that account altogether unworthy of attention.

The material of inside decorative work is at present limited almost entirely to wood. To satisfy the public taste, which is constantly becoming more exacting and fastidious, there must of course be varieties of style and treatment. The numerous cabinet woods afford variety in grain and color, and can be manipulated into endless changes, but like the bits of glass that are tumbled about in a kaleidoscope, there is nothing very new or striking in the successive combinations. There is variety, to be sure, but at the same time there is monotony, and this because the material is all the while the same.

The cars upon many roads get sombre and dingy, and need furbishing up so as to present a more cleanly and cheerful appearance. This is more especially the case upon lines that have a large local traffic in the vicinity of large cities, the bulk of which during the fall and winter is carried after dark. New cars also have to be built to replace the old ones, and these, as a rule, have to be "gilt-edged" in order to keep up with the times. To ring the changes on the old regulation wood-work is like giving the kaleidoscope a new turn, with no very marked results. Now, I propose to make an inroad upon the old practice, or rather break away from it, by trying something new—a bold step, I admit, but I think it is bound to succeed.

In a word, my plan is to introduce paper, and wall-paper at that, for the inside decoration of cars. Paper has already got into the wheels, where it is doing good service, and why not have it in the car body as well? Some will say it is too cheap and flashy; let us stick to the mahogany and rosewood. This, I am inclined to think, is an error. Wall papers can be had that are as beautiful for panel ornament as any one can desire, the price ranging for $4 to $20 for a roll of eight yards, according to quality, pattern and style, some of the finer kinds so closely resembling tapestry that the difference is only detected on a close inspection. For that part of the car below the windows I would use paper of a dark pattern, and nearly as heavy as leather. Some of the qualities made are, in fact, so stout and tough that it is called "leather" paper. For the window panels, a lighter shade, but warm in color, is more suitable. There are several styles of this kind, some of which are made to order in this country and some imported. There are also borders to match the paper, which can be introduced with excellent effect upon the panels between the windows and elsewhere. For the panels above the windows a "frieze" paper can be used, which is pretty expensive, some of it costing fifty cents per foot, and even more. The ground is solid gold, with figures in delicate colors relieved by dark outlines; and with a continuous pattern running from end to end of the car, the effect is exceedingly beautiful. The panels upon which this paper covering is put may be of whitewood, or of whatever timber will make a good surface for the paper.

Another innovation I would suggest. Instead of the old canvas head-linings that have been so long in vogue, I would substitute, not Eastlake ceilings with dull colors and half conventional, half natural flowers, but some of the English paper ceiling patterns, to be put upon thin panels well secured to the carlins. These are called "all-over" patterns; that is, they appear as well from one point of view as another, the figures being distributed uniformly over the surface. The edges are finished by a well matched border.

With this material, and with these combinations, several important advantages are secured. No painter, even if he has the patterns, can decorate a car as handsomely at the same cost, which is less than half the cost of ordinary inside finishing. The designs also are much better than road shops can afford to buy, and better than any workman in the shops can produce. These designs are elaborate and artistic, the productions of men trained to the work and with a special aptitude for it. When the cars finished in this way get a little soiled and dingy, the paper can be cleaned, or it can all be stripped off and new patterns put on. The paper will, indeed, bear two cleanings without material injury; but when it is renewed, with new patterns, it is equivalent to a new inside. A new outside, as every body knows, can be put on a car by burning off the paint, repainting and revarnishing; but not so with the inside if is a cabinet-wood finish. By means of the proposed paper finishing, cars can be kept fresh looking, attractive and beautiful, inside as well as outside, and this is more than can be said of the best wood-finishing ever put into a Pullman or any other car.

It may be asked whether paper can be attached to wood surfaces so as to remain firm and smooth, and without being affected by expansion and shrinkage. In regard to this, it must be understood that the finer grades of paper can be dampened without injury to their color or texture, and that paste will cause it to adhere with great tenacity. In shrinking, it comes down to a perfectly smooth surface. The wood surface to which the paste is applied should be free from varnish or oil, or in case of any difficulty on this score with panels that have already been varnished, they may be covered with coarse muslin and the paper pasted or glued to that, or a preparation called the "Grant Adhesive" may be used. The back of the panels should in all cases have a coat of rough stuff to prevent warping, or "coming and going" with the weather. The paper itself has some little elasticity, and after it is put on should be protected with a coat of varnish. Some kinds of embossed paper are intended not only for a coat of varnish, but will take paint also, should any retouching be required. This class of paper is very heavy and durable, and can be applied the same as canvas. It is occasionally necessary to allow a little time for the moisture of the paste or glue to penetrate the paper and expand it, so that when it dries there will be no wrinkles. The heavy papers are strong enough to bind ½-inch stuff 18 inches wide, if they are allowed to swell all they will before putting on.

It is to be hoped that some of our enterprising and progressive road managers will make a trial of this method and test its merits.

O. I. C.

The High Speed Problem.

To the Editor of the National Car-Builder:

Before high railroad speed, so much talked about at present, is a success with the present loads carried, a substitute for the link motion must be found. The link as a perfect expansion gear is a failure, and while for high speeds, with the present loads, more boiler and grate surface is an imperative necessity, it is an almost equal necessity that an expansion gear be used which will make a far better disposition of the steam.

No builder of automatic cut-off stationary engines would think of using the link and a single valve if he was aiming at good economy, nor would the designer of a large marine engine use the link otherwise than as a mere reversing gear. Economy in both cases is the *desideratum*.

While railroad men who favor high speeds are showing the necessity of more boiler and grate surface, it would seem to be in order to make an attempt to get more work out of the present supply of steam by adopting a better expansion gear. When cutting off close at high speeds, the link wire-draws the steam badly, it exhausts too early and closes the exhaust and cushions too early. The writer has seen indicator cards, from what were supposed to be first-class locomotives, when cutting off short, in which the exhaust and compression line ran nearly parallel with the expansion line, and on an average of from 12 to 15 pounds below it. There are in the market automatic cut-off stationary engines which run as many revolutions per minute as the locomotive, and which compress nearly to the initial pressure. A locomotive making as good a card would show from 20 to 50 per cent more work for the same sized cylinder and point of cut-off, than the cards made by the average link engine. On a certain road there is a passenger engine designed by a prominent master mechanic, which, when running full stroke, exhausts at *fourteen* inches, the cylinders being 16×22. While the link may not be directly chargeable with the performance of the valve at full stroke, this instance serves to show how an imperfect cut-off, at best, may be made the worst in the world in ignorant hands.

The writer had the opportunity some years since of comparing the link and V-hook engines. The latter were fitted with a cut-off valve on the back of the main valve, the cut-off valve being driven from a "sword-arm." The V-hook engines were quicker to start a train, would handle bigger trains, and perform equal work with less fuel than the link engines, both classes being in all respects the same, aside from the valve motion. This style of V-hook can be arranged to cut off in either motion. The amount of repairs on these engines was not appreciably, if any, greater than on the link engines, and the valve gear of the V-hook can be thoroughly overhauled at a less outlay of time and money than with the link engine, the repairs being simpler.

With the V-hook engine the evils of wire-drawing disappear; the exhaust closure and opening can be arranged to suit the ideas of the designer—to be as late as desirable, and compression may commence much later, and by means of reduced clearances be extended to the initial pressure. With the link engines, however, the evils of wire-drawing, early exhaust opening and closure, and contracted exhaust openings, are rapidly increased as the point of cut-off is shortened. In the V-hook engines, as the travel of the main valve is constant, and as its shortened travel in the link engines causes the evils complained of, it is plainly to be seen that the V-hook engines are free from the defects of the link.

A valve gear for a high speed engine, if loaded with the present loads, will be found in a modification of the V-hook. The link is a good reversing gear, and if fitted with a cut-off valve on the back of the main valve, for expansion purposes, an improvement in the economy of the engine would be the result.

As no automatic cut-off stationary engine builder would think for a moment of building an *economical* engine with a single valve for the distribution and exhaustion of the steam, it does seem out of place for locomotive builders to attempt it, inasmuch as the stationary engine builders have carried the economical use of steam much nearer perfection than locomotive builders ever dreamed of, and as high speed depends either upon a greater supply of steam, or a more economical use of the present supply. The link is certainly simple, but it doesn't seem advisable to throw away good econ-

omy because the link is a trifle simpler than another gear which is much more economical.

High speed with light loads is not the problem, for this is the condition of things in England, where their average fast passenger train speed is from 50 to 60 miles an hour, with loads of half the weight hauled by similar engines in this country. The real problem is a *maintained* speed of 60 miles an hour or thereabouts, with the present loads. A well designed, ordinary link engine with 5½ foot drivers, will make, on a favorable track with two or three cars, a speed of from 50 to 60 miles an hour for short stretches. The writer has ridden on a V-hook engine with 4½ foot drivers and 16 × 20 cylinders, six miles in six minutes, each mile being run in from 58 to 62 seconds, as the track was more or less favorable. The engine was pulling two baggage and two passenger cars, carried a gauge pressure of 140 lbs., and cutting off at six inches. It is not the pulling of three or four cars at 50 miles an hour, but eight or ten or more cars at that speed, which is going to be, and is, the difficult part of the high speed problem. FRANK C. SMITH, M. E.

DELAWARE, O., Jan., 1881.

Four-Wheel Cars.

To the Editor of the National Car Builder:

Two kinds of education are requisite in all mechanical design and construction, and especially in reference to railroads. The mere theorist will spend hours in illustrating a point by means of technical formula, while a practical man will accomplish the same thing in two minutes with his pocket rule and the knowledge derived from experience. The theoretical man can, as a rule, out talk and out figure his so-called practical brother, and carry the day, for the time being, at least, with that very numerous class of people who expect somebody else to think out intricate mechanical problems for them. The theorist aims at the truth, but often misses the target because he lacks a modicum of knowledge which can only be obtained by practice. The civil engineer will, by his book formula, determine the elevation of the outer rail of a curve, but the road-master, standing by the track when trains pass at different speeds, discovers a defect in the work of the engineer, not by algebraic processes or arithmetical science, but by superior acuteness of observation acquired by years of practical experience.

So it is in the construction and running of cars. Theorists and hobbyists get cars built in accordance with plans which work charmingly on paper or in a miniature model, but the crucial test is the work they can do on the track under ordinary conditions of service. Train men are the best judges of their adaptability to such conditions. The car repairer knows something of their strength and durability as compared with cars of a different construction; the car greaser knows about the number of hot journals, the engineer about the tax upon motive power, and so on. With respect to the comparative economy of four and eight-wheel cars, if the facts could be obtained from train men, the question would not long remain an open one. But unfortunately the position of these men as subordinates is not favorable to a free and untrammeled expression of their opinions.

When the writer, in his capacity as master mechanic, was first called upon to handle 12-ton 4-wheel coal cars, and look after their condition, the impression formed as to their advantages was not a favorable one, but he concluded to suspend judgment until they had been fairly tested. When, however, one of them came in with a hot journal (4×8), the brass weighing 16½ lbs., and so hot that it had broken in two, the lubricant used being polar grease, and when it became evident that a much larger proportion of journals got hot on these than on 8-wheel cars, it became necessary to look for the cause. Upon investigation there was found to be but little difference in the amount of journal-bearing surface in the two classes of cars, and that the weight on journals per car was very nearly the same. The heating, therefore, could not be due to any excess of weight on the bearing surfaces of the journals. Another trouble was the constant breaking of springs, although they were as heavy and as strong as those used on 8-wheel cars, the latter carrying heavier loads over the same track and in the same trains. By close watching, it was found that the breaking was caused by the heavy blows of the wheels on a rough track and bad rail-joints, these blows being so much more severe than those of the truck wheels of the other cars that they could readily be distinguished from them by the ear. This heavy pounding had no doubt much to do with forcing the lubricant from between the brasses and journals, and, in connection with the rigid frame, caused uneven bearing and heating.

Having apparently traced the unusual heating of journals and spring-breaking to their origin, further developments in the running of these 4-wheel cars were awaited, and they soon came. The track having been thrown out of line in a cut, a train, in the middle of which were two of these cars, had to pass over it. The engine and 8-wheel cars kept the track, but as soon as the 4-wheel cars reached the bad place they both left the track, the 8-wheel cars behind them staying on. In order to get at the true inwardness of this occurrence, an experiment was resorted to. Two 4-wheel cars, one of them empty and one loaded, were pushed round a very sharp curve by an 8-wheel engine. The empty car mounted the outside rail. In the pushing, there was of course no strain on the draw-heads toward center of track; and so the cars were next pulled round the curve, but did not leave the rails, the draw-heads being pulled toward center of track and the wheels from the outer rail. The experiment, which was several times repeated, proved that in pushing, the empty car would leave the track three times in five, but in pulling, it left the track but once in eight or ten trials. When the track was oiled the car would not mount the rail. These results seemed to warrant the conclusion that these cars would probably run well enough upon a straight and smooth track, but not on a crooked and rough one; and this is the opinion of the great majority of train men and others who are practically familiar with the handling of cars.

In regard to length of wheel-base, Mr. Partridge, in his article in the November CAR-BUILDER, alludes to the fact that horse-cars, with their wheels close together, pull harder around very sharp curves than when the wheels have more spread. This can readily be explained. Let a single pair of wheels, for example, be started on a curve. They are soon out of square with the track, the inside wheel being ahead, and the flange of the other crowding the rail and biting upon it so as to stop the wheel or throw it off the track. In the same way two pairs of wheels in a rigid frame, with short base, will run to outside of track on a curve, and get out of square in proportion to the clearance between rails and flanges—on the same principle that a block running in a groove can be thrown out of square in proportion to its width and length. The longer the base, the less can the wheels, with the same clearance, get out of square with the track, and the nearer parallel with the rail will be the flanges. In the experiments referred to with empty and loaded cars, it was demonstrated that the pressure of the wheel flange of the loaded car against the outer rail of the curve was sufficient to overcome the friction of the inner wheel on the rail, and allow the car to slide over, so as to follow the rail around the curve. But with the empty car the result was quite the other way. The outside flange would mount the rail unless the track was oiled, in which case the action was the same as with the loaded car.

The long base of a 4-wheel car, and the long base of a truck moving with a center-plate, differ essentially in their action. In the former case the weight rests upon four points of the track, and in curving, the forward half of the load must be crowded over by the flange pressure. In a long base track, however, the load swivels on the center-plate, the car body following the truck and the truck the curve of track. It is a noteworthy fact bearing upon this problem, that the English road managers, in spite of their proneness to adhere to their own methods, admit the superior adaptation of our cars and engines for running upon curves and rough track, this superiority being chiefly if not entirely due to the use of trucks and a comparatively short wheel-base. The radical defects in the 4-wheel 10-ton coal or merchandise cars are their rigidity and long base. They are destructive both to themselves and to the track, and a departure from correct and economical principles of construction. CRAWFORD.

Rule for the Valuation of Freight Cars.

To the Editor of the National Car-Builder:

I have noted the communication of Mr. John Ortton, in the September number of your journal, on the "Valuation of Freight Box Cars," and the table he gives of their value at different years, based upon a value of $450 when new, and worked out according to rule 17 of the M. C. B.'s rules. Can you give us a rule that will apply to a new car or part of a car of any value? B.

The simplest universal rule is to use the following table, which is Mr. Ortton's, with an additional right-hand column, giving per cent. of value.

Age.	Value.	Annual depreciation.	Per cent. of value.
New	$450.00		$100.00
End of 1st year	423.00	$27.00	94.00
" 2d "	397.62	25.38	88.36
" 3d "	373.77	23.85	83.06
" 4th "	351.34	22.43	78.08
" 5th "	330.26	21.08	73.39
" 6th "	310.45	19.81	68.99
" 7th "	291.82	18.63	64.85
" 8th "	274.31	17.51	60.96
" 9th "	257.86	16.45	57.30
" 10th "	242.39	15.47	53.86
" 11th "	227.85	14.54	50.63
" 12th "	214.18	13.67	47.59
" 13th "	201.33	12.85	44.74
" 14th "	189.25	12.08	42.06
" 14th " *	180.00	9.25	40.00
	(60 per cent.)	$270.00	

*And 297 days.

RULE.—To find the value of a car or a piece of car of any new value, at any given year: Multiply the per cent. for the given year in the right-hand column by the new value, and the product will be the value at the given time.

EXAMPLES, AT 6TH YEAR.

Box car	new value,	$450 × 68.99 = $310.45
Flat car	" "	350 × 68.99 = 241.46
Coal car	" "	250 × 68.99 = 172.47
Trucks	" "	240 × 68.99 = 165.75

Railway Manners.

There is something about the conditions of railway traveling that brings out all the latent selfishness of human nature. From the moment a certain class of people approach a railway ticket office, to the time when they emerge from the station at the other end of the line, their motto is, every man for himself and the devil take the hindmost. And at the hands of such people the "unprotected female" is as liable to rudeness, imposition and neglect as is the modest, unassuming man who is content to take his own share of what comfort may be provided for travelers and to get the fair, reasonable worth of his money and no more.

This class of super-selfish people, who regard the public railway train as their private, individual property, and who are so disagreeably familiar on our lines of American travel, is by no means peculiar to this country. Its great characteristic being an intense selfishness, it is naturally

to be found wherever intense selfishness forms an element of society—that is to say, everywhere. England, it is scarcely necessary to say, supplies as abundant illustrations of bad railway manners as can be found anywhere in the world. A recent number of the London *Telegraph*, discussing this question, says: "Far too prevalent is the doctrine that stage carriages and railway trains are made for the sole comfort of each individual, and not for the common enjoyment of the many. Travelers by rail are specially liable to continual annoyance from those who are apparently too blind to see the disagreeable effects of their own determined selfishness. The whole of the compartment is considered to belong to such a person from the moment he has purchased his ticket. He is inclined to take half a dozen seats, at least, though he has only paid for one; all the cushions on starting for a journey are strewn with miscellaneous articles to deceive others into the belief that the seats have been taken, whereas it is a trick and no more, and one very often fatal to the comfort of late arrivals on the platform. Then comes the window question; one wants it open and the other insists upon its being closed, the lover of fresh air having as a rule secured a position with his back to the engine, and out of the wind, while his miserable companion is exposed to the full power of the cutting blast and to immediate danger of neuralgic pains. Instead of using the netting provided overhead for small parcels, or thrusting a small portmanteau under his seat, the selfish traveler often strews the floor of the carriage with packages, and if any one happens to get in at an intermediate station, regards his presence as a personal annoyance. The error is entirely on the part of the first comer, who makes himself comfortable and does not care what happens to any one else; but let a stranger enter the carriage, as he has a perfect right to do, and he is met with scowls simply because room has to be made and the confusion lessened that never ought to have been created."

We do not know exactly the same forms of monopolizing railway facilities in this country that are here described, and some of which are peculiar to the compartment system of the English roads. But there is a great deal too much of the same surly, unaccommodating spirit, that scowls at the timid passenger, and often drives him or her along from seat to seat, until there is nothing left but the close company of the red-hot stove or the blasts of cold from the door whenever it is opened. We are all familiar with the railway lout who sprawls himself out over four seats, pretending to be asleep and appearing to be intoxicated, and with the snappish woman entrenched among her bundles and bags, and bridling and fumbling over the necessity of compressing herself within the space she has paid for, entirely unconscious that the severest trial falls upon the person who has to sit beside her.—*Exchange.*

The *Railroad Gazette* contains the following table of railroad construction mileage east and west of the Mississippi river during the last nine years.:

	East of Miss.	Per cent.	West of Miss.	Per cent.	Total.
1872	4,353	59.3	2,987	40.7	7,340
1873	1,927	39.3	2,956	60.7	3,883
1874	1,487	73.5	538	26.5	2,025
1875	949	60.8	612	39.2	1,561
1876	1,150	47.0	1,304	53.0	2,460
1877	1,114	48.4	1,187	51.6	2,301
1878	1,178	40.4	1,738	59.6	2,916
1879	1,285	28.1	3,285	71.9	4,570
1880	1,452	20.4	5,698	79.6	7,150

Thus the increase in new construction has been almost entirely west of the Mississippi. There was only 15 per cent. more road built east of the Mississippi in 1880 than in 1879, while *seventy-one* per cent. more was built west of it.

THE C., C., C. & I. Railroad is about to increase its equipment by the addition of 10 heavy mogul engines and 1,000 freight cars.

Canvas-Back Rattan Car Seats.

The accompanying cuts represent a style of car seats of which the Hale & Kilburn Manufacturing Company, of Philadelphia, are the inventors and proprietors. The material of the seating consists of close woven cane or rattan, cemented to a substantial canvas backing; this combination producing what has already proved itself to be the strongest and most durable cane seating that has ever been put upon the market.

Fig. 1 shows the seat complete, with Buntin's iron frame. Fig. 2 is a bottom view of the cushion frame, showing the springs and the ash slats upon which they rest. Upon these springs, and riveted to them, is a slatted flexible top, which covers the upper surface of the seat, as shown in Fig. 3. This top is composed of narrow hard-wood slats $\frac{1}{8}$ inch thick, to which the canvas is firmly cemented, thus giving a uniform bearing and an even distribution of the weight. The whole is tied together by steel straps running crosswise, which prevent the springs from getting loose or becoming displaced. This seat frame construction is equally well adapted for plush upholstering, and as such is in extensive practical use. The springs and slats are made of the best tempered cast steel, and the arrangement is such that the seat is thoroughly and uniformly springy in every part. Fig. 4 shows the construction of the Cobb elliptic steel spring seats, which the above named company are now manufacturing under contract. The rattan-canvas seats have been extensively introduced on many important roads, including the New York Central; Phila., Wil. & Balt.; Illinois Central; New York Elevated and others.

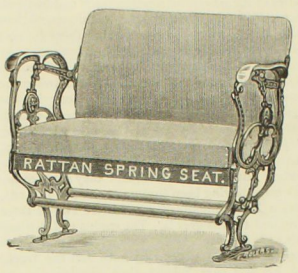


Fig. 1.

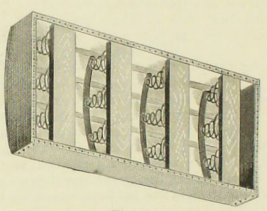


Fig. 2.

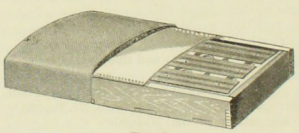


Fig. 3.

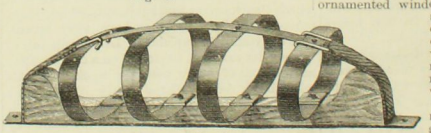


Fig. 4.

Palace Car Building in Canada.

The Quebec, Montreal & Occidental Railway has for some time been noted for the superiority of its first-class passenger-car equipment. Two additions have just been made to it, consisting of two drawing-room and sleeping cars, built under the supervision of Mr. A. Davis, the capable and efficient mechanical superintendent, and named respectively "Robitaille" and "Chapleau," in honor of the Lieutenant-Governor and Prime Minister. The first-named car is described as follows in the Montreal *Gazette*:

The car is 75 feet in length, with 60 feet in the clear. The outside appearance is very striking, and the excellent way in which it has been built and then decorated and finished is sure to attract more than ordinary attention. The car is mounted on two six-wheel trucks of the best and most modern pattern. The patent expansion links and levers controlling the side bearings are also attached. Ascending the steps, at the side of which are silver-finished railings, the passenger stands on the platform and faces the back of the car and the handsome, solid black mahogany door, with silver handle and finely decorated plate-glass window. On entering the car one gazes upon a scene of beauty which reminds him of some story of eastern magnificence and luxury.

To describe the minute details of all the care and trouble taken by the artist in painting and the sculptor in chiseling these magnificent pieces of master art is a task for which we readily admit our incapacity. The car is made to serve as a palace or drawing-room car in the daytime and as a sleeping car at night, and equally fulfills these two objects. The day car contains 28 reclining, revolving and rocking chairs, covered in red silk plush, and well adapted to the purposes required. The floor is covered with Brussels carpet of elegant design. To the day passenger the beds are wholly out of sight, as they are concealed in superbly finished massive panels. These panels form a very attractive feature of the whole by the artistic work with which they are covered. Made of the finest black mahogany, and supported by massive silver hinges, they are decorated with flowers, baskets of fruit, etc., carved out of the finest Italian satin-wood, turquois, emerald, rose and other woods. At intervals over the large plate-glass bay windows are to be seen carved figures in black walnut. Elaborate lamps hang from the ceiling, painted in the most *recherché* Egyptian and Oriental designs. Sitting diagonally, the passenger looks out of the ornamented windows, covered with heavy dead satin and silk curtains, supported by rich silk tassels. At the end of the car is the state-room, which in itself is worthy of a monarch. The next compartment is a double lavatory, in which are to be found all the requisites for the toilet. The noticeable feature here is two grand plate-glass mirrors, which will satisfy the wishes of the most coquettish damsel. At night the scene is changed into one of more natural need, although still preserving its beauties for all that. Heavy silk curtains fall on the day's scenes, and hide from view 28 of the most improved spring couches, and for which one must have a good word for the mechanical superintendent. When one lies down to take a rest, the advantages in this respect over all other palace and sleeping cars is that, instead of the passenger lying on hot cushions, he enjoys a sweet sleep on an improved mattress, supported by the patent wire spring bed. He has also the advantage of half the window, which is three times larger than in other cars. The advantage for the upper berths is that in case of accident there is no danger of being thrown out, as the panels supporting them are fast and cannot close. The ventilation of the cars has also received particular care.

The "Chapleau" is of the same construction as

every particular. The estimated value of each is $30,000, and both are said to compare favorably with any cars built in the States or anywhere else. The credit of their design and construction is due to Mr. Davis, who is the owner of the patents.

Railroad Grade Crossings in Vermont.

The Legislature of Vermont at its recent session passed the following act regulating the movement of trains at the crossing of one railroad by another railroad:

SEC. 1. When a railroad is crossed by another railroad at grades, every engineman on either of the roads shall, before reaching the crossing, stop his engine at some point within 1,000 feet therefrom, shall sound the whistle before starting and pass slowly over the crossing; but one stop shall be sufficient for all such crossings within 1,000 feet of each other on the same road.

SEC. 2. An engineman who violates the provisions of the preceding section shall be fined $100, and the corporation on whose road the offense is committed shall be fined the further sum of $300; and one-fourth part of each penalty collected shall go to the person making the complaint.

Luminous Paint.

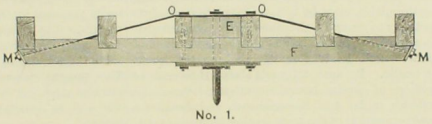
According to the London *Building News*, luminous paint is getting into quite extensive use in England. Mention is made of offices coated with the paint which give great satisfaction to the occupants. The effect is that of a subdued light, every object in the room being clearly visible, so that in a room so treated one could enter without a light, and find any desired article. The luminous paint is excited by the ordinary daylight, and its effect is said to continue for about thirteen hours, so that it is well adapted for painting bedroom ceilings, passages that are dark at night, and other places where lamps are objectionable or considered necessary. For staircases and passages a mere band of the paint will serve as a guide, and costs but a trifle. For outdoor purposes the oil paint is used, but for ceilings and walls the luminous paint, mixed with water and special size, can be used the same as ordinary whitewash, and presents a similar appearance in the daylight. The recent discovery that it can be applied as ordinary whitewash considerably expands the field of its usefulness. Sheets of glass coated with the paint are in use in some of the vessels of the navy, at the Waltham powder factory, at Young's paraffine works, and in the spirit vaults of several London docks; and now that, by increased production and the use of water as the medium, its cost is reduced by one-half, it will probably be extensively used for painting walls and ceilings. The ordinary form of oil paint has already been applied in many ways, to statues and busts, to toys, to clock faces, to name plates and numbers on house doors, and to notice boards, such as "mind the step," "to let," etc. The paint emits light without combustion, and therefore does not vitiate the atmosphere. Several experimental carriages are now running on different railways, the paint being used instead of lamps, which are necessary all day on account of the line passing through occasional tunnels.

THE Manchester (N. H.) Locomotive Works have received an order from the Atchison, Topeka & Santa Fé road for 13 engines, to be finished by Aug. 1.

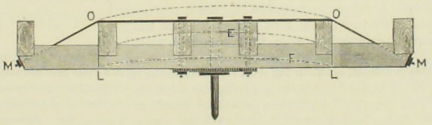
The Trussing of Freight Car Body-Bolsters.

We have received the following communications upon this subject, in response to the request made in our last issue for the views of car-builders in regard to the two methods of trussing of which we gave diagrams:

Mr. M. Dowler, of the Chicago & Eastern R. R. Car Shops, Danville, Ill., says that the law of gravitation is the primary principle which underlies all questions of this kind, and, if this is not kept steadily in view, errors in construction are pretty sure to be the result. Referring to the accompanying cuts, he says that the car body is in both cases supported on the truck by the center-plates, and that the portions which project on each side beyond the two center floor timbers, must be supported crosswise by the bolster *F* and the truss-rods. In plan No. 1, the bolster truss-block, composed of the block *E*, the center floor timbers on each side, and also the thickness of the body bolster *F*, with the center-plate underneath, all firmly bound together by the bolts *O O*, make a rigid truss-rod bearing over the center-plate or point of support for the car body. In plan No. 2, however, the two intermediate floor timbers are pressed into service as bolster truss-rod blocks, while the block proper (*E*) answers only as a filling in, and is of no service except to the center-pin, the space between the intermediate and center timbers being left without any support except the horizontal portions of the bolster and truss-rods between those points. In plan No. 1, the rods extending obliquely from *O* to *M*, represent the full trussing power of the rods, the rigid truss-block



No. 1.



No. 2.

allowing of no elasticity between the points *O O*. It is therefore evident that the portions of the bolster *F*, between the points *L* and *M*, will only be supported by the truss-rods between *O* and *M*, which is all that is required in plan No. 1. But in plan No. 2, the distance between the intermediate floor timbers is left without any trussing except what is furnished by the bolster itself, for the reason that the portion of the truss-rods between *O* and *O*, in both drawings, have no trussing power except what is offered by their horizontal tension, and which in plan No. 2 will give the bolster a tendency to assume the position indicated by the curved dotted lines, causing an undue weight on the side-bearings, and interfering with the free adjustment of the truck to the track.

Mr. John Lightner, Master Car-Builder of the Boston & Providence R. R., writes as follows:

"I notice in your January number the illustrations of two methods of trussing freight car body-bolsters. I think No. 1 is the better way. Our freight cars carry the load on the side-bearings, and for 35 years we have used no body-bolster trusses. Before beginning some new cars now in course of construction in our shops, we examined some of our old ones that have been in service 12 or 15 years, and could discover no reason for trussing the bolsters. So the new cars will have no such trussing. The bolster construction is shown in the accompanying cuts. As will be seen by Fig. 1, we use no center floor timbers, but only two intermediates placed equidistant from each other and the side sills. These intermediates are 6 × 8 in., and the sills 4½ × 9 in. We use the same number and arrangement of timbers in our passenger cars, but as they are center-bearing, we have always trussed them with four ⅞ in. rods, as shown in

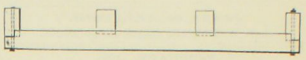


Fig. 1.

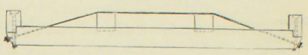


Fig. 2.

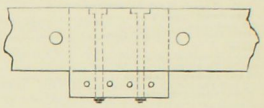


Fig. 3.

Figs. 2 and 3. Instead of tenoning the body-bolsters into the sills, they are boxed in 1½ inches, and secured by two bolts and two sill tie-rods. This makes it easy to renew the bolster without tearing the car in pieces."

Mr. J. D. McIlwaine, of the Missouri Car and Foundry Co., says that a freight body-bolster trussed over center and intermediate timbers both, would, so far as he can judge from his own experience, assume a kind of wavy line after running a while, being elevated at the middle and the two ends, and depressed at the intermediates, for the reason that the weight or strain is concentrated over the side-bearings where it should not be, instead of over the center-plate where it should be. When trussed over the center timbers only, the tendency is to draw the ends of the bolster up so as to relieve the pressure on the side-bearings, which is the thing most wanted in a center-bearing car. Of the two methods given in our last sue, he prefers No. 1, or the center-bearing truss, to No. 2, or side-bearing truss.

Mr. John Ortton of the Canada Southern writes as follows:

With reference to the "Problem" published in the CAR-BUILDER last month, illustrated by two diagrams, showing different methods of trussing freight car body bolsters, I am of the opinion that diagram No. 1 is decidedly preferable to No. 2, for the reason that as the weight of the body is sustained on the under side centre of the bolster—the centre-plate forming, as it were, a pivot bearing—and the truss rods being strained downwards immediately over the centre sills, there can be no upward deflection of the bolster in the centre, nor any downward tendency at the ends, consequently the bolster retains a rigid position, so long as the truss-rods remain sound and as originally fixed.

In diagram No. 2 the truss-rods are strained over the intermediate sills, while the centre sills receive no downward pressure from the rods, and, consequently, with any upward pressure at the centre of the bolsters, causing an upward deflection, the ends will readily curve upward and form an arch, springing from the intermediate sills as abutments.

THE Gilbert & Bush Co., at Troy, N. Y., is full of passenger car work.

THE Illinois Central Railroad shops are building 300 box cars and 100 coal cars for the road.

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Addresses.—*Business letters should be addressed, and drafts and money orders made payable, to* THE NATIONAL CAR-BUILDER. *Communications for the attention of the Editor should be addressed* EDITOR NATIONAL CAR-BUILDER.

Advertisements.—*Nothing will be inserted in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *The editorial department will contain our own views and opinions; and the rest of the reading matter, aside from advertisements, will be such as we consider of interest to our readers.*

Contributions.—*Articles relating to railway rolling stock construction and management, and kindred topics, by those who are practically acquainted with these subjects, are especially desired. Also early notice of changes in railroad officers, organizations and names of companies.*

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RAILWAY LEGISLATION.

Every winter revives the demagogue legislative agitation of the railroad transportation problem. Rates must be regulated according to a uniform pro rata basis and fixed laws, so that nobody in all the land can complain of extortion or discrimination in dealing with railroads. All the perplexing complications of a vast continental traffic must be adjusted to a scale of simplicity as easy of comprehension as the three-cent letter postage system, but far more equitable. It would never do for railroads to charge the same rate for all distances every where and at all times, as in the case of letter postage, yet this is substantially the kind of reform which the cheap politicians in and out of Congress are so eager to bring about. That these wire-pullers and anglers for popularity are incapable of understanding the labyrinthian intricacies of railway transportation is not surprising, but it really is a wonder that with the evidence before their eyes they should be so blind to their own incapacity as they appear to be—so blind, in fact, as not to take a lesson from railroad men themselves, the most intelligent of whom confess their inability to grasp the mighty system in all its unfoldings and progressive tendencies. It is a new thing in the world, with no antetypes, analogies or traditions in the past. It is also a big thing, the growth of which has apparently but just begun. Any crude, hasty, inconsiderate legislation in regard to it is sure to recoil upon itself. Of this there have already been signal illustrations, and more are to come. It might as well be understood now, as it inevitably will be at no very distant day, that, strictly speaking and practically, railroads are not to be regulated by legislation, but legislation is to be regulated by them rather. Communities may encourage or connive at hostile agitation, while the well-being of every individual member is none the less absolutely dependent upon railroads, and in the long run is bound to shape legislation so as to promote such well-being instead of destroying it.

Governmental control must of course be exercised to a certain extent to check abuses that are inseparable from such a system. Some favor an exclusively national control, so as to relieve the States of the burden, and at the same time avoid all conflicting local legislation. Such a scheme is absurd, for a multitude of reasons that it would be a waste of time to specify. It can never succeed in this country nor in any other country whose territorial extent exceeds a good-sized potato patch. The business of railroads, like all other great lines of business in active and enterprising communities, must be left to regulate itself, subject only to general legislation directed against particular abuses, but not interfering with the natural growth and tendencies of the great currents of traffic. Because railroads absorb thousands of millions of capital, because contiguous lines consolidate under one management, and because a vast proportion of the transportion business of the country is virtually controlled by three or four men, it does not follow that these magnates can combine whenever it suits their convenience, to lay the country under tribute and exact heroic rates of freight between the west and the seaboard; or in other words, organize a prodigious strike to which the entire population would be forced to succumb. They are neither demigods nor demagogues, but finite mortals and business men whose interests are identical with the interests of their customers. No better proof of this need be cited than the steady decline in freight rates during the past ten years, and the enormously multiplied traffic upon these great, expanding, far-reaching lines. It is not necessary to quote the figures. They are in all the newspapers of the land. We have sometimes thought it would be a good plan to establish a few seminaries for special instruction in the science of railroad transportation, and that no person shall be considered eligible to a seat in Congress or in the State legislatures unless he shall have graduated with honor at one of these institutions.

THE TIOGA CENTER CALAMITY.

Another horror has been added to the catalogue of railroad accidents. A midnight train, speeding through the darkness at the rate of 35 miles an hour, is hurled from the track with the quickness of thought, a conflagration instantly follows, and five persons are burned to death in spite of all efforts to rescue them. A larger, but more fortunate number, are injured, and escape with life. It is not our province to dwell on the sickening, heart-rending details. The question is, Where lies the blame? The popular verdict will be, "Nowhere;" for who could guard against an unseen and unsuspected flaw in a driving-axle, when it was unknown even to the makers of the axle themselves. Was there carelessness, temerity and recklessness in running the train? From a railroad point of view, we must answer, No. There were a hundred trains running in the same way, on as many different roads, on the same night, and they made their time and reached their destination without accident. The Tioga mishap was exceptional. From a purely rational, common-sense point of view, however, there was a recklessness and a temerity perfectly astounding. A postal car, as inflammable as tinder, with no adequate means for exit in a sudden emergency, heated with coal stoves in full blast, and lighted with numerous oil lamps, was as perfect a trap, under the circumstances, as ingenuity could contrive, and the event proves it. Talk of safety-stoves and safety-lamps! both of them excellent things in a gentle, easy-like overturn; but in a crash and concussion that shatters iron like crockery, and renders futile the best planned devices, they could scarcely stand the ordeal better than the driving-axle. This car, we believe, had in it no safety-stoves or lamps. If so, the venders of these appliances lost an excellent opportunity for testing their merits in a dire extremity. Saws and axes are also excellent things to have in a car on such an occasion, but are of little use if the inmates are too much disabled to use them.

Well, who after all is to blame for this sacrifice of life by this hideous process of burning alive? The whole community must share in it, and we feel constrained to say, even the victims themselves. The risks of railroad traveling are voluntarily assumed by those who incur them, and are understood to be inseparable from the advantages derived. The great public is as ready to take these risks to-day as it was a week or a month ago. The present calamity is only a ripple, which attracts attention for the time being, but which will soon be forgotton, except by the bereaved and injured.

STREET CAR PROPULSION.

The use of horse power for propelling street cars is a rude and clumsy method, and will one of these days give place to something better. It is hard on horses, hard on drivers, and very unsatisfactory to passengers. Steam cars, steam dummies, compressed air motors and other plans, have been tried on the surface roads in our large cities, and in many cases with apparent success, so far as could be perceived by mere lookers-on. But for reasons not altogether clear to the general public, all these experiments have resulted in nothing save disappointment to the inventors. The old, bungling system continues in spite of the increased and ever growing burden of travel and consumption of horse-flesh. Of the many bad features about it, perhaps the the worst is the stopping of loaded cars at every crossing to let off and take on passengers, thus severely taxing the sinews of the overworked animals, who are so frequently compelled to start the load from a state of inertia. This is bad enough on a level track, but on grades that are at all steep, an additional horse and driver have to be constantly employed to help along each car.

A system of surface roads has been in successful operation in the city of San Francisco for about eight years, in which horses are not used at all. It was necessitated by the hilly and rolling surface upon which a large part of the city is built. There are four of these roads, their length varying from one to three miles. One of them has an average grade of 1 foot in 9; the others average less than this, although in some places it is as steep as 1 in 6. The total elevation of the upper terminus of the shortest road above the lower terminus is 307 feet, another is 265, and another 141 feet. A brisk

business is done on all of them, and especially on the shortest and steepest line, upon which it is very heavy. Now, it is manifest that horse-power could have been used upon these lines just as well as in Albany, Brooklyn or New York, only more horses per mile would have been necessary, more effective brake appliances, more outlay of capital, higher fares, and more patience on the part of passengers. The projectors, however, boldly struck out for something new, and their audacity has been more than justified by the result. The method, stated briefly, is as follows:

The tracks are laid in the usual manner. Midway between the rails is a continuous piece of iron, with a slot or opening in its entire length, about $\frac{5}{8}$ of an inch in width. In an open space below this runs, on rollers, an endless chain or cable, which is operated by an engine placed about half way between the termini of the line. In place of the horses is a small open car, to which the regular passenger cars are attached. This leader, or dummy, is rigged with a flat iron lever, so arranged that the man in charge can drop it into the slot and cause it to clamp firmly or loosely upon the running cable beneath. When clamped firmly the car is drawn along as fast as the cable goes. When desirable, the hold is loosened and the cable allowed to slip a little, thus decreasing the speed, and, by loosening it entirely, the car is stopped. A brake, operating upon the iron plate below, enables the manager to come to a halt very quickly, even on very steep hills. The cars run quietly, are thoroughly manageable, and horses are not scared by them. The longest cable in use is something over two miles. It has been found that a thirty horse-power engine will run 9,000 feet of cable over the steep grades.

The cost is said to be about $50,000 per mile, but when once in operation it is said to be much cheaper to maintain than an ordinary horse-car road doing the same proportionate business. The question is: Can not a similar plan be adopted with advantage upon horse lines in New York and elsewhere, that are now overburdened with traffic? The elevated roads have already deprived two old scare-crows of their imaginary terrors, namely: the frightening of horses by steam motors, and the predicted destruction of the business of the surface lines by the elevated lines. There is evidently much room for progress in surface line construction and management.

MODEL DAY PASSENGER COACHES.

There are quite a number of day passenger coaches running on the New York Division of the Pennsylvania Railroad that are models of well-designed construction and beautiful finish. In their outside appearance they are not readily distinguishable from the other cars of the road in the same trains. It is only when the style of their inside decoration is careful scrutinized in its details and general effect that one becomes impressed with its appropriateness and beauty. Where there is such an unlimited scope for the indulgence of fanciful conceits and vagaries as in the inside finish of passenger cars, it is no small merit to have hit upon such an arrangement and choice of material as to satisfy the most fastidious as well as least cultivated tastes. It is seen at a glance that there is no attempt at mere display, no straining after effect; or, if the designer were really prompted by such a desire it is not apparent in the harmony and completeness of the result.

The material employed is hard woods, chiefly ash, with a few subordinate strips and moldings of cedar or cherry. This gives to the car a light and cheerful, as well as strong and solid appearance, which is not the case with veneering or with solid mahogany or walnut. The ornamental treatment of the wood-work and ceiling is perhaps as good an example of the so-called Eastlake style as can be found in this class of cars. The window panels have channeled grooves in the form of a rectangle running along their outer margin and crossing at the corners, while in the middle and at the top and bottom well executed sunken rosette carvings are sparingly but effectively introduced, leaving a good quantity of plain surface ornamented with the handsome natural grain of the ash. In this way the too much neglected principle of ornamenting construction instead of constructing ornament is adhered to. The head-linings harmonize with the prevailing style of the wood-work, the ground colors being light and subdued, and the borders and center-pieces unique and simple without being over prominent. The brass basket racks are also of a style that seems to be suggested by the panels and ceiling, each matching the other in a general unity of form, lines and angles. In this kind of ornamentation, the pleasing and satisfying result is not due to any one feature of the work, but rather to a happy combination or blending of all the parts so as to avoid incongruity. The test of true art is to conceal art. Ordinary observers do not probably think of ornament at all when riding in these cars, because there is little in the startling, vulgar way to suggest it. It is, in fact, so thoroughly and skilfully subordinated to the material, and so simple, direct and honest in its every detail, that it cannot well be contemplated apart from the base upon which it rests, and with which it is strictly identified. We hope to be able to publish, in a future number of the CAR-BUILDER, some illustrations of this style of car finishing, but we advise those who are at all interested in the subject to see the cars for themselves.

THEORY AND PRACTICE.

These terms are often used in a way which seems to imply a necessary antagonism between the ideas they represent. The popular impression is that what is theoretical is necessarily speculative and conjectural, and that what is practical is quite otherwise. This impression is evidently a wrong one, and grows out of the fact that the strictly theoretical man and the strictly practical man are not well enough acquainted with each other. One is a student of books, and believes that all mechanical problems can be solved by mathematics and pure science. The other has no abiding faith in anything that cannot be tested by his finger-ends and the sight of his eyes. With him, seeing is believing, and if his other senses confirm his belief, there is an end of it, no matter what the books may say. Both acquire valuable information in different ways—one by book lore, and the other by the hard knocks of practical experience; and if the two kinds of knowledge could be assimilated it would be of great mutual advantage to the possessors, both of whom have their deficiencies. A little familiarity with books would often supply the practical man with information that would save him much time and labor; and a little grimy shop experience would, on the other hand, convince the mere student that all knowledge is not to be found in books. The fact is, that theory underlies and is the foundation of all mechanical and scientific progress, and the man of the practical school is often more of a theorist than he supposes. A true theory is always indissolubly connected with a true practice. The two are correlative and co-existing counterparts, like a pair of scissor-blades which perform their functions best when properly united by a rivet, but which will do a little cutting in a poor sort of way when disunited and used separately. Every intelligent human action which involves any complexity is necessarily guided by theory, either true or false, good or bad. Take, for example, the mystery of boiler explosions. About all that is practically known of the causes is the fact that the internal pressure is greater than the shell of the boiler will bear. This is as far as the purely practical man has got towards ascertaining the actual causes and conditions of the dreaded phenomenon, and it is as far as he is likely to get without the aid of theories to direct his efforts in analyzing the nature of the hidden forces that are brought into action, and to apply a certain and effective remedy. The man who habitually despises theoretical inquiry is pretty sure to become a victim to mental obtuseness and narrow-mindedness, shut up to the limited range of his own experience, which is nothing to him if not intensely practical.

There is, of course, a theoretical habit of mind, a habit of building air castles for the mere enjoyment of the thing, that is destructive of good practical work. It is more properly speculation, without substantial basis, and bears the same relation to true theorizing that stock gambling does to legitimate trade. It is, in fact, a kind of counterfeit coin that brings what is genuine into some degree of discredit, but it also implies and proves that there *is* a genuine.

AT the January meeting of car-builders at the association rooms, 113 Liberty street, the discussion of the subject of car painting was continued. Papers were read by Mr. N. C. White, Prof. Chas. Hornbostel, and Mr. Franklin Murphy. At the February meeting, which will be held on the 17th inst., the subject of uniformity in car construction, with special reference to the safety of train men, will be discussed.

A FEW of the friends of the late Christopher Woods have recently erected in the Allegheny Cemetery, Pittsburg, a monument of Italian marble to his memory, with an appropriate inscription. Mr. Woods was well known to many of our readers as the former Master Car-Builder of the Union, National and Allentown fast freight lines, and in whose employ in that capacity he remained for nearly fourteen years, when he was compelled to leave their service on account of failing health. He was one of the original members of the Master Car-Builder's Association, and attended all its earlier meetings.

The Mechanical Engineer.—This is an illustrated eight-page weekly publication devoted to "mechanical engineering, applied mechanics, and the allied arts." Judging from the numbers already received, it is likely to prove a valuable accession to technical journalism. It is handsomely printed in large clear type, the editorial and other reading matter is pointed, practical and instructive, the illustrations are copious, and altogether it is a paper that can hardly fail to be favorably appreciated by the class of readers for whom it is intended. Mr. Watson, the senior editor, is a mechanical engineer of experience and ability. Published by Egbert P. Watson & Son, 5 Beekman street, New York. Price, $2.00 a year.

THE *Railroad Gazette* has published in pamphlet form a full report of the proceedings of the second annual meeting of the Road-Masters' Association, held in Chicago, Sept 8, 1880. Price of single copies 50 cents.

THE *Railway Age* begins the new year with a handsome pea-green cover. Another new feature of this enterprising journal is the weekly publication of new railway patents, with illustrations.

BOUND VOLUMES of the NATIONAL CAR-BUILDER for 1880, may be had at the office, No. 5 Dey street; or, if preferred, they will be forwarded by express to parties ordering them. Price, $3.00

JOHN L. GILL & CO., at Columbus, O., are building a large number of cars for the Toledo, Delphos & Burlington road.

PATENT safety brakes have been put upon the car of Juggernaut, in India, in order to prevent casualties when running on down grades.

New Method of Inlaying Wood.

A new method of inlaying wood has been contrived by a furniture manufacturing house in England. The process is as follows: A veneer of the same wood as that of which the design to be inlaid consists—say sycamore—is glued entirely over the surface of any hard wood such as American walnut, and allowed to dry thoroughly. The design is then cut out of a zinc plate about $\frac{1}{20}$ of an inch in thickness, and placed upon the veneer. The whole is now subjected to the action of steam, and made to travel between two powerful cast-iron rollers of eight inches in diameter by two feet long, two above and two below, which may be brought within any distance of each other by screws. The enormous pressure to which the zinc plate is subjected forces it completely into the veneer, and the veneer into the solid wood beneath it, while the zinc curls up out of the matrix it has thus formed, and comes away easily. All that now remains to be done is to plane down the veneer left untouched by the zinc until a thin shaving is taken off the portion forced into the walnut, when, the surface being perfectly smooth, the operation will be completed. it might be supposed that the result of this forcible compression of the two woods would leave a ragged edge, but this is not the case, the joint being so singularly perfect as to be unappreciable to the touch; indeed, the inlaid wood fits more accurately than by the process of fitting, matching and filling up with glue, as is practiced in the ordinary mode of inlaying.

Novel Method of Cutting Iron and Steel.

Some time since it was announced that Jacob Reese, of Pittsburg, Pa., had succeeded in cutting iron and steel by simply revolving near it, at high speed, a thin disc of steel. We are now in a position to give some additional details of his "fusing disc." The disc is 42 inches in diameter, scant $\frac{5}{16}$ of an inch thick, and smooth on its periphery. It is made either of wrought iron or of soft steel, is nicely balanced, and runs at a velocity of 25,000 feet a minute at its periphery. Mr. Reese holds that it is the impact of the particles of air hurled with great velocity against objects held near the periphery of the disc that effects the fusion of steel. A groove is instantly melted into a round bar of steel held before the fusing disc, and the steel drops down in a fused metallic state. When the motion of the disc is stopped, it may be noted that the disc does not touch the bar of steel, there being a space on each side and in front of it. This is proved by the fact that while the disc is only $\frac{3}{16}$ of an inch in thickness, the groove made into the steel is $\frac{5}{16}$ wide, thus showing an air space of $\frac{1}{16}$ of an inch on each side and one-eighth of an inch in front of it. When the disc is in proper order, so that it has no lateral movement, the ends of the bar melted through are smooth. It is stated by Mr. Reese that the operation of the fusing disc differs from the "cold saw" so widely used for rails, etc., in one important particular. The dust from the cold saw is thrown away from the latter as an oxide, while the fusing disc melts the metal.—*Iron.*

Heating Cars in Sweden.

The *English Mechanic* says in a recent number: "The heating of railway carriages on the government lines in Sweden with steam began in 1871-72, the Haag system being adopted. This system, though having many good points, did not fully realize expectations. About three years ago M. Lilliehök, a Swedish engineer, devised a system, which has proved to be much better adapted to the conditions of the country, and is now used on all the government lines and on some private ones. Its special feature, as compared with the Haag system is, that the fresh air of the coupé, instead of being heated in the coupé itself, is heated in a holder previous to entering. By this arrangement a good ventilation is secured, and the heated air is much more agreeable. A wooden tube or case is fixed under the carriage (from which it is easily detachable). This incloses the steam-pipe, which is furnished with a large number of disks to increase the heat-surface. The carriage has a double floor, with open interval. In the bottom of the wooden tube are holes to admit the cold air, and after heating the air enters through valves (controlled by the passengers) under the seats, and covered by brass netting. The caoutchouc tubes, connecting the pipes of adjoining carriages, are bent upward, so that condensation water does not accumulate in them. This water is let off at the ends of the iron pipes about every $11\frac{1}{2}$ hours. The interval under the carriage always being filled with warm air, passengers have no trouble from cold feet. The cost of maintenance of the system is said to be trifling."

Spontaneous Combustion.

Le Technologiste has the following in reference to this subject: A handful of cotton waste soaked in boiled oil and wrung out was put with some dry cotton in a small box, in which was a hole for introducing a thermometer. The room in which the box was placed had been kept at a temperature of 169° Fah. The thermometer in the box soon began to rise rapidly, and in an hour and a quarter stood at 343° Fah., smoke issued from the box, and, on exposure to the air, the cotton burst into a flame. In a room of the same temperature, and with a box $6.3 \times 4.7 \times 4.7$ inches, boiled linseed oil and cotton took fire in five or six hours, and with rape-seed oil in ten hours. In a room at 133° Fah., cubes of cotton wrapped in paper and saturated with olive oil ignited in six hours; castor oil required more than twenty-four hours; whale oil ignited in four hours; spermaceti, which does not contain glycerine, did not take fire; with seal oil combustion took place in two hours; heavy coal oils did not take fire.

THE EXCELSIOR LUMBER DRYER, of which Messrs. Curran & Wolff, of Chicago, are the proprietors, is a very great improvement in the process of artificial lumber drying. The drying by this method is effected by steam-heated air, so applied and regulated as not to fry, cook or burn the lumber. The seasoning process is not merely the crude application of heat to the surface of the lumber, but is made to begin at the center and work towards the surface gradually, thus permeating the whole mass, and converting green, fresh cut or wet lumber into perfectly dry stock in from five to seven days, and at the trifling cost of only 25 cents per 1,000 feet. A car load of 12,000 feet dried by this method weighs no more than a load of 6,500 feet without drying, thus saving a large percentage in freight. The details of the process cannot be fully understood without actual inspection. Establishments run by steam can have dryers easily attached and run by exhaust steam; or, when water-power is used, steam can be furnished by a special boiler, with sawdust, shavings or other refuse for fuel. These dryers are in use on a number of prominent railroads, also in most of the large car-building establishments. The proprietors are now building eight kilns for the new Pullman Car Works, in Chicago.

A MAN went out and hanged himself the other day because a dentist told him his tooth was affected with "nodular calcification of the pulp." He left a note to his wife, saying he didn't want to live on and give it to her and the children.

"WHAT is hell?" asked a Lutheran Sunday-school teacher of a boy in the class. "A shirt with the button off," replied the boy. "Explain yourself; what do you mean, sir?" demanded the meek but surprised teacher. "Well I heard pa say to ma, the other morning, when he put on a shirt with the back button off, 'Well, this is hell.' That is all I know about it."

Our Directory.

We note the following changes since our last issue. Readers are requested to give us prompt notice of changes when they occur:

Alabama & Great Southern.—Col. Chas. P. Ball has resigned the position of General Superintendent. Mr. M. J. Meehan has been appointed Master Mechanic, to have charge of motive power, cars and machinery.

Cairo & St. Louis.—Mr. Charles Hamilton has been appointed General Superintendent, in place of L. M. Johnson, resigned.

Chicago, Burlington & Quincy.—Mr. E. L. Johnson has been appointed Master Mechanic of St. Louis Division, at Beardstown, Ill., in place of Henry Whiting, resigned.

Chicago, Milwaukee & St. Paul.—Mr. F. C. Butterfield has been appointed Master Mechanic of the Iowa & Dakota Division. He was formerly on the St. Paul & Sioux City road.

Chicago, Rock Island & Pacific.—Mr. R. H. Chamberlin has been appointed Superintendent of the Illinois Division, with office in Chicago. He has been Train-Master for several years.

Chicago, St. Paul, Minn. & Omaha.—Mr. J. Reniff has been appointed Master Car-Builder, with office at Sioux City, Iowa.

Chicago & Northwestern.—Mr. J. S. Oliver has resigned the position of General Superintendent on account of ill health.

Credit Valley.—Mr. H. G. Taylor, formerly on the Midland railway, has been appointed Superintendent and Master of Transportation of this Canadian road.

Denver & Rio Grande.—Mr. George W. Cushing has been appointed General Superitendent, with office at Denver, Col. He has been for many years Superintendent of Machinery on the Missouri, Kansas & Texas.

Fitchburg.—Mr. John W. Marden has been appointed Master Car-Builder in place of Enos Varney, deceased. Mr. Marden has for several years been the Master Car-Builder of the Norwich & Worcester Division of the New York & New England road.

Indianapolis & St. Louis.—Mr. C. C. Gale has been appointed General Superintendent in place of E. B. McClure, resigned.

Long Island.—Mr. Austin Corbin succeeds Thomas R. Sharp as Receiver, the latter being relieved at his own request. Mr. James Thompson has been appointed Master Mechanic in place of M. Meehan. He will also have charge of the Car Department.

New York, Pennsylvania & Ohio.—Mr. Wm. Fuller, General Master Mechanic, will for the present act as Master Car-Builder also, in place of Mr. J. H. F. Wiers, who has gone to the Pullman Company.

Ohio Central.—Mr. F. W. Stewart has been appointed Purchasing Agent, with office at Toledo, O.

Old Colony.—Mr. F. P. Moseley, who has for several years been Purchasing Agent of the road, died of pneumonia, Jan. 8.

Pittsburg, Cincinnati & St. Louis.—Mr. D. T. Bacon, of Logansport, Ind., has been appointed Superintendent of the second division until further notice, and Mr. J. R. Trimmer, of Chicago, Superintendent of the third division.

Shepang.—Mr. C. B. Platt has resigned the position of Superintendent, after a service of several years on the road.

Sioux City & Pacific.—Mr. J. S. Wattles has been appointed Superintendent, vice F. C. Hills appointed General Traffic Manager.

Terre Haute & Indianapolis.—Col. Joshua A. Hill has been appointed General Superintendent, with office at St. Louis, Mo.

Toledo & Ann Arbor.—Mr. Harry W. Ashley has been appointed Superintendent, vice Jas. M. Ashley, Jr.

Toledo, Burlington & Delphos.—Mr. F. M. Mast has been appointed Master Mechanic, vice George H. Tier, resigned.

Virginia Midland.—This is the new name of the Washington City, Virginia Midland & Great Southern.

Valley of Ohio.—Mr. Bela C. Bosworth has been appointed Master Mechanic. He has been locomotive engineer on the road since its opening.

CONTINUOUS DRAW-BAR PATENTS.

The following circular has been issued by the Secretary of the Western Railroad Association:

CHICAGO, Sept. 9, 1880.

To the Members of the Association:

GENTLEMEN: Claims have been pending for several years that the Continuous Draw-Bar sold by the Continuous Draw-Bar Company under the Middleton and the Griffith and Patterson patents is an infringement of patent 71,580, granted 3d December, 1867 (reissue No. 8,095, granted 19th February, 1878), to Edward L. Caum.

This Association has continuously advised against entertaining this claim, but to quiet all questions, and at our instigation, the Continuous Draw-Bar Company has recently purchased the Caum patent, its owners inserting in the assignment a full and absolute release to all the members of the Eastern and Western Railroad Associations from any and all liability for, or on account of, any infringement heretofore of said patent. Yours truly,

J. H. RAYMOND, Secretary, etc.

CLARENCE BROOKS & Co.

MANUFACTURERS OF

RAILWAY CAR AND FINE COACH VARNISHES.

Cor. West and West 12th sts., New York.

JOHN W. MASURY & SON,

MAKERS OF STRICTLY FIRST-CLASS

RAILWAY VARNISHES,

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CAR BODY COLORS.

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PENNSYLVANIA RAILROAD CO., Enoch Lewis, Purchasing Agent, Philadelphia, Pa.
PENNSYLVANIA CO., Wm. Mullins, General Purchasing Agent, Pittsburg, Pa.
BALTIMORE & OHIO RAILROAD CO., N. S. Hill, Purchasing Agent, Baltimore Md.
CHICAGO & ALTON RAILROAD CO., A. V. Hartwell, Purchasing Agent, Chicago, Ill.
CHICAGO & NORTHWESTERN RAILROAD CO., R. W. Hamer, Purchasing Agent, Chicago, Ill.
LEHIGH VALLEY RAILROAD CO., L. Chamberlin, Purchasing Agent, Philadelphia, Pa.
NORTHERN RAILROAD OF CANADA, F. W. Cumberland, Superintendent, Toronto, Ont.
NAUGATUCK RAILROAD CO., G. W. Beach, Superintendent, Waterbury, Conn.
PHILADELPHIA, WILMINGTON & BALTIMORE RAILROAD CO., S. A. Hodgman, Superintendent of Motive Power, Wilmington, Del.
NEW YORK, NEW HAVEN & HARTFORD RAILROAD CO., R. N. Dowd, Commissary, New Haven, Conn.
UNION PACIFIC RAILROAD CO., KANSAS } A. D. Clark, Purchasing Agent, Omaha, Neb.
CHICAGO, BURLINGTON & QUINCY RAILROAD CO., Wm. Irving, Purchasing Agent Chicago, Ill.
LOUISVILLE, CINCINNATI & LEXINGTON RAILROAD CO., Wm. Mahl, Purchasing Agent, Louisville, Ky.
GRAND TRUNK RAILWAY N. Wall, Port Huron, Mich.
LITTLE ROCK & FORT SMITH RAILROAD CO., T. Hartman, Purchasing Agent, Little Rock, Ark.
GILBERT & BUSH CO., Troy, N. Y.
WASON MANUFACTURING CO., Brightwood, Mass.
BILLMEYER & SMALL MANUFACTURING CO., York, Pa. } Railroad Car Builders.
JACKSON & SHARP CO., Wilminton, Del.
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The advantages derived from the use of such Special Colors are many a few of which are found below:
ABSOLUTE UNIFORMITY OF SHADE. **DURABILITY,** as we use perfectly pure materials. **SAVING OF MONEY,** because of small quantity required. **SAVING OF TIME,** in the putting on of the same. **SAVING OF LABOR AND MATERIAL,** as no extra amount of Varnish will be required to hide a sanded surface. **LARGER DEGREE OF CERTAINTY** that there will be an absence of cracked work, as our mixtures are all uniform, being done by weight only.
We make any desired shade, it only being nece ary that purchasers furnish us with sample of color desired, stating the time they would like to have the paint dry in.
We shall be glad to furnish samples and give p ces to any who may wish to avail themselves of the above advantages.
Very respectfully,

JOHN W. MASURY & SON, New York and Chicago.

D. F. TIEMANN & CO.,

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CALIFORNIA VERMILION,

Made from Pure Quicksilver. Unsurpassed in Body, Shade and Durability.

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PAINTS AND COLORS, RED AND WHITE LEAD, ORANGE MINERAL, DROP BLACKS, ULTRAMARINE AND PRUSSIAN BLUES, YELLOWS AND GREENS, AND IRON OXIDES, ALL OF FINEST QUALITIES, DRY AND IN OIL, SPECIALLY PREPARED FOR RAILROAD USE.

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No. 24 Columbia St., New York,
MAKER AND PATENTEE OF IMPROVED
HYDRAULIC JACKS, PUNCHES, BOILER-TUBE EXPANDERS,
AND
DIRECT ACTING
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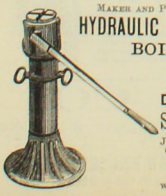
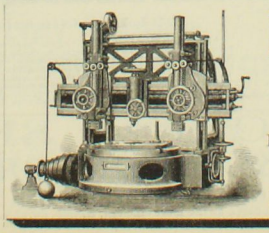


JACKS FOR PRESSING ON CAR-WHEELS OR CRANK-PINS MADE TO ORDER.
Communications by letter will receive prompt attention.



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For Railroad, Locomotive and Car Shops.

All From New and Improved Patterns.

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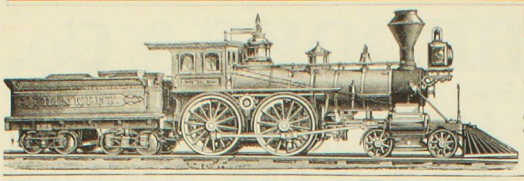

HINKLEY LOCOMOTIVE COMPANY.

(ESTABLISHED IN 1839.)

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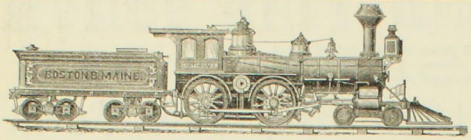

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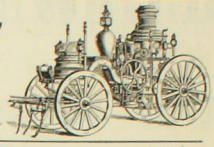

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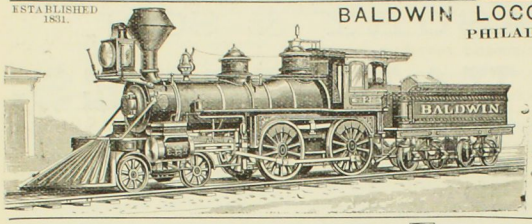

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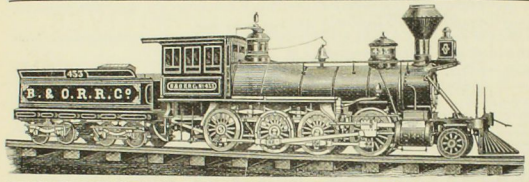

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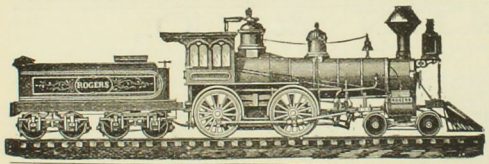

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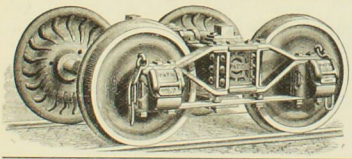

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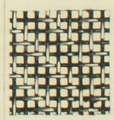

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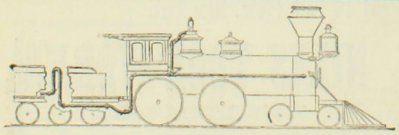

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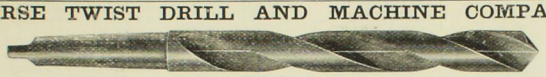

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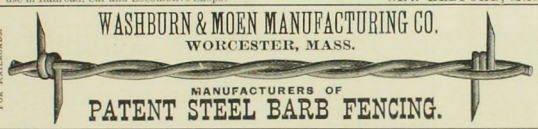

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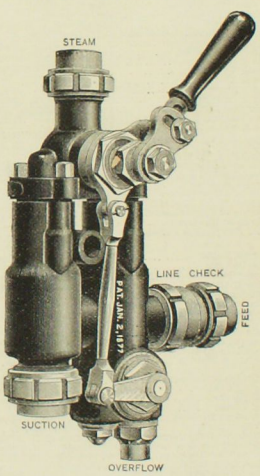

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D

Railroad.	*Master-Mechanic.*	*Master Car-Builder.*	*Residence.*
Dak. So. & Sioux City & Pembina	J. H. Moulton	J. H. Moulton	Yankton, Dak.
Danbury & Norwalk	N. M. George	N. M. George	Danbury, Conn.
Danville & Southwestern	B. L. Baldwin		Danville, Ill.
Davenport & Northwestern	H. E. Woods		Davenport, Ia.
Dayton & Union	H. S. Gordon	H. S. Gordon	Dayton, O.
Dayton & Southeastern	F. McCreery		Dayton, O.
Dayton & Michigan	John Black		Lima, O.
Delaware, Lackawanna & West.	Walter Dawson	Robert McKenna	Scranton, Pa.
Morris & Essex Division	W. H. Lewis		Kingsland, N. J.
Morris & Essex Division		J. W. Baker	Dover, N. J.
Oswego & Syracuse Division	James Buchanan		Syracuse, N. Y.
Utica, Chenango & Susq. Div.	Tho. Thatcher		Utica, N. Y.
Bloomsburg Division	Charles Graham		Kingston, Pa.
Delaware & Chesapeake	Jos. A. Baynard		Easton, Md.
Delaware & Hudson Canal Co.	**R. C. Blackall		Albany, N. Y.
Delaware & Hudson Canal Co.		T. Orchard	Carbondale, Pa.
Rensselaer & Saratoga Div.	J. L. Corey	Chr. Körner	Green Island, N. Y.
Denver Pacific	§R. McDougall	‖John Clock	Denver, Col.
Denver & Rio Grande	N. W. Sample	N. W. Sample	Denver, Col.
Des Moines & Fort Dodge	John McGrayel	E. A. Avery	Grand Junction, Ia.
Detroit & Bay City	R. P. Baillie		Bay City, Mich.
Detroit, Grand Haven & Mil.	Fred Parker		Detroit, Mich.
Detroit, Lansing & Northern	G. C. Watrous	G. C. Watrous	Ionia, Mich.
Dorchester & Delaware			Cambridge, Md.
Dunkirk, Allegheny Val. & Pitts.	J. C. Haggett	J. C. Haggett	Dunkirk, N. Y.

E

Railroad.	*Master-Mechanic.*	*Master Car-Builder.*	*Residence.*
East Broad Top	Wm. C. Maynes		Orbisonia, Pa.
Eastern		J. D. Billings	Salem, Mass.
Eastern	D. S. Wallis		East Boston, Mass.
Eastern Kentucky	D. L. Weaver	D. L. Weaver	Riverton, Ky.
E. Tennessee, Virginia & Georgia	C. A. Hodge	Joseph Armbruster	Knoxville, Tenn.
Erie & Pittsburg	J. N. Wood	J. N. Wood	Erie, Pa.
Eureka & Palisade	J. M. Alson		Eureka, Nev.
European & North Am. (of Maine)	A. O. Bailey	A. O. Bailey	Mattawamke'g, Me.
Evansville & Terre Haute	John L. White	Joseph Stiker	Evansville, Ind.

F

Railroad.	*Master-Mechanic.*	*Master Car-Builder.*	*Residence.*
Fitchburg	§§Geo. A. Cooledge	J. W. Marden	Charlestown, Mass.
Vermont & Mass. Div.	W. A. Foster		Fitchburg, Mass.
Flint & Pere Marquette	T. J. Hatswell	T. J. Hatswell	E. Saginaw, Mich.
Florida Central	James S. McElroy	James S. McElroy	Jacksonville, Fla.
Flushing, North Shore & Central	Thomas Meehan	‖Edward Riley	L. I. City, N. Y.
Fort Wayne & Jackson	C. W. Hollister		Jackson, Mich.
Fort Wayne, Muncie & Cincinnati	Wm. McPhail	Wm. McPhail	Fort Wayne, Ind.

G

Railroad.	*Master-Mechanic.*	*Master Car-Builder.*	*Residence.*
Galv., Harrisburg & San Antonio	§§D. T. Davis	‖Jas. Alexander	Harrisburg, Tex.
Galveston, Houston & Henderson	J. G. Conlon		Galveston, Tex.
Geneva, Ithaca & Sayre	J. N. Weaver		Waverly, N. Y.
Georgia	John S. Cook	T. M. Preval	Augusta, Ga.
Grand Haven	A. S. Parish		Allegan, Mich.
Grand Tower & Carbondale	Hugh Smith	Hugh Smith	Grand Tower, Ill.
Grand Trunk	†Herbert Wallis	Wm. McWood	Montreal, Canada.
Grand Trunk	‖Warren Noyes		Gorham, N. H.
Grand Trunk		‖Duncan Menish	Portland, Me.
Grand Rapids & Indiana	J. M. Boon		Fort Wayne, Ind.
Grand Rapids & Indiana	‖J. R. Fish	‖J. R. Fish	Gr'nd Rapids, Mch.
Grayville & Mattoon	C. H. Cory		Mattoon, Ill.
Great Western, of Canada	†C. K. Domville		Hamilton, Can.
Great Western, of Canada	C. F. Hanson	Henry Childs	London, Ont.
Green Bay & Minnesota	‖Edw. Osborne		Green Bay, Wis.
Gulf, Colorado & Santa Fe	Geo. B. Nicols	Geo. B. Nichols	Galveston, Texas.

H

Railroad.	*Master-Mechanic.*	*Master Car-Builder.*	*Residence.*
Hanover Junction & Gettysburg	John J. Bingley	John J. Bingley	Hanover, Pa.
Hannibal & St. Joseph	**Tho. G. Gorman	Tho. G. Gorman	Hannibal, Mo.
Havana, Rantoul & Eastern	J. McCarthy		Rantoul, Ill.
Housatonic	N. Slingland	J. J. Ferris	Falls Village, Conn.
Houston, East & West Texas	J. E. Wiggin		Houston, Tex.
Houston & Texas Central	L. C. Noble	James McGee	Houston, Tex.
Huntingdon & Broad Top	Wm. Barkla		Saxton, Pa.

I

Railroad.	*Master-Mechanic.*	*Master Car-Builder.*	*Residence.*
Illinois Central	**S. J. Hayes	W. B. Snow	Chicago, Ill.
Chicago Division	Henry Schlacks		Chicago, Ill.
South Division	David Oxley		Centralia, Ill.
North Division	J. B. Edams		Amboy, Ill.
Iowa Division	Thomas W. Place		Waterloo, Ia.
Springfield Division	W. B. McKenna		Clinton, Ill.
Illinois Midland	R. N. Pringle		Paris, Ill.
Illinois & St. Louis	J. H. Smith		Belleville, Ill.

Railroad.	*Master-Mechanic.*	*Master Car-Builder.*	*Residence.*
Illinois & St. Louis		Charles Rothe	E. St. Louis, Ill.
Indianapolis, Decatur & Springfield	Pulaski Leeds	Pulaski Leeds	Indianapolis, Ind
Indianapolis, Peru & Chicago	John McKenna	John McKenna	Peru, Ind.
Indianapolis & St. Louis	A. J. Sanborn	A. J. Sanborn	Madison, Ill.
Indiana, Bloomington & Western	C. A. Thompson	C. A. Thompson	Urbana, Ill.
International & Great Northern	R. H. Johnson	H. H. Sessions	Palestine, Tex.
Intercolonial	‡H. A. Whitney	Edw. Shaffer	Moncton, N. B.
Iron	Perry Scott	Clem Roetling	Ironton, O.

J

Jacksonville, Pensacola & Mobile	Jas. D. Hollister		Tallahassee, Fla.
Jeffersonville, Mad. & Indianapolis	Wm. Swanston	Edw. Austin	Jeffersonville, Ind.
Jacksonville, N. West. & S. East	B. J. Miller		Jacksonville, Ill.
Joplin	P. T. Butterly	P. T. Butterly	Girard, Kan.
Junction & Breakwater	J. A. Maguire		Lewes, Del.

K

Kansas City, Fort Scott & Gulf	J. S. McCrum	A. N. Montier	Kansas City, Mo.
Kansas City, Lawrence & South'n	J. S. McCrum		Kansas City, Mo.
Kan. City, St. Jo. & Coun. Bluff	F. A. Chase	Theo. Aylesbury	St. Joseph, Mo.
Kansas Central	Wm. McCall		Leavenworth, Kan.
Kansas Pacific	**John MacKenzie	T. B. Roberts	Armstrong, Kan.
Kaw Valley Division	James Long		Armstrong, Kan.
Smoky Hill Division	John B. Daily		Ellis, Kan.
Denver Division	R. DeDougal	John Clock	Denver, Col.
Kentucky Central	J. R. Ledyard	J. L. Hackathorn	Covington, Ky.
Knox & Lincoln	E. Bolton	C. L. Turner	Bath, Me.

L

Lake Erie & Western	**Everett Clemons		Fremont, Ohio.
Lake Erie & Western	¶H. L. Cooper		Lafayette, Ind.
Lake Ontario Southern	Geo. Thompson	Wm. Currier	Sodus Point, N. Y.
Lake Shore & Michigan Southern	James Sedgley	††John Kirby	Cleveland, Ohio.
Michigan Southern Division	Geo. W. Stevens		Elkhart, Ind.
"		Frank O. Bray	Adrian, Mich.
Toledo Division	J. M. Sanborn	W. O. Smith	Norwalk, Ohio.
Erie Division	L. O. Gassett	J. Withycombe	Cleveland, Ohio.
Buffalo Division	Edward Studley	A. C. Robson	Buffalo, N. Y.
Lehigh Valley	John I. Kinsey		South Easton, Pa.
Lehigh Valley	P. Hofecker		Weatherly, Pa.
Lehigh Valley	John Campbell		Delano, Pa.
Lehigh Valley	D. Clark		Hazleton, Pa.
Lehigh Valley	A. Mitchell		Wilkesbarre, Pa.
Lehigh Valley		Jno. S. Leutz	Packerton, Pa.
Little Rock & Fort Smith	James Eblin	James Malone	Argenta, Ark.
Little Rock, Miss. River & Texas	Joseph Taylor	Joseph Taylor	Arkansas City, Ark.
Los Angeles & Independence	Jas. Velsir	J. S. Young	Los Angeles, Cal.
Louisville, New Albany & Chicago	Geo. H. Ruhlandt	Geo. H. Ruhlandt	New Albany Ind.
Long Island	Jas. Thompson	Jas. Thompson	L. Isl'd City, N. Y.
Louisville, Cincinnati & Lexing'n	A. Schaeffer	A. Schaeffer	Louisville, Ky.
Louisville & Nashville	**Reuben Wells	H. Middleton	Louisville, Ky.
Nashville & Decatur Div	W. H. Thomas	J. P. Furguson	Nashville, Tenn.
South & North Ala. Div	C. W. White		Birmingham, Ala.
Ev., Hen. & Nashville Div	Thos. Walsh	W. H. H. Price	Mt. Vernon, Ill.
Clarksville Division	Wm. Adair		Bowling Green, Ky.
Ev., Hen. & Nashville Div	W. H. Thomas		Edgefield, Tenn.
Memphis & Ohio Div	Wm. Pike		Memphis, Tenn

M

Macon & Brunswick	R. Wagnon	R. Wagnon	Macon, Ga.
Maine Central	J. W. Philbrick	J. W. Philbrick	Waterville, Me.
Maine Central		C. H. Kenison	Augusta, Me.
Manchester & Lawrence	J. T. Gordon	J. T. Gordon	Concord, N. H.
Manhattan Beach	Lewis James		Bay Ridge, L. I.
Manhattan Elevated	T. W. Peeples		New York, N. Y.
Marietta & Cincinnati	E. M. Bosley	E. M. Bosley	Chillicothe, Ohio.
Marquette, Houghton & Onton'gn	W. H. Williams	H. D. Lyons	Marquette, Mich.
Memphis, Paducah & Northern	G. M. Taylor	G. M. Taylor	Paducah, Ky.
Memphis & Little Rock	Thos. Rennell	P. Twitchell	Argenta, Ark.
Memphis & Charleston	§H. N. Burford	J. J. Kasey	Memphis, Tenn.
Michigan Central	S. H. Edgerly		Jackson, Mich.
Michigan Central		††Robert Miller	Detroit, Mich.
Midland of New Jersey	W. C. Ennis		Wortendyke, N. J.
Milwaukee, Lake Shore & West'n	S. Charnly		Manitowoc, Wis.
Minneapolis & St. Louis	Thos. Downing	Thos. Downing	Minneapolis, Minn.
Mineral Point	Robert Hay	Robert Hay	Mineral Pt., Wis.
Mineral Range	George F. Coon		Hancock, Mich.
Mississippi & Tennessee	Geo. Hasinger	S. J. Bolton	Memphis, Tenn.
Missouri & Western	A. C. Persing		Pierce City, Mo.
Missouri Pacific	§§John Hewitt	John Hodge	St. Louis, Mo.
Missouri Pacific	R. D. Grant		St. Louis, Mo.
Missouri Pacific	Geo. W. Walshe		Sedalia, Mo.
Missouri Pacific	H. V. Farles		Atchison, Kan.
Mobile & Montgomery	C. W. White	Lewis Barham	Montgomery, Ala.
Mobile & Girard	J. C. Albrecht	A. J. Nix	Columbus, Ga.
Mobile & Ohio	R. H. Briggs	J. T. Booth	Whistler, Ala.
Mobile & Ohio	John Fitzgerald		Macon, Miss.
Mobile & Ohio	M. T. Carson		Jackson, Tenn.
Montgomery & Eufaula	D. M. Gugel	James A. Knight	Macon, Ga.
Morgan's Louisiana & Texas	N. Tilton	Wm. O'Brien	Algiers, La.

N

Nashua & Lowell	S. A. Davis	S. A. Davis	Nashua, N. H.
Nashville, Chattan'ga & St. Louis	James Cullen	J. G. Sawyer	Nashville, Tenn.
St. Louis Division	L. B. Salisbury	W. H. H. Price	Mt. Vernon, Ill.
Naugatuck	Henry Hanford	George W. Gray	Bridgeport, Ct.
Nebraska	D. Hawksworth		Plattsmouth, Neb.
Nevada Central	Wm. Sutcliffe		Battle Mountain, Nev.
Newburg, Dutchess & Connecticut	W. G. Vanbuskirk		Dutchess J'n, N. Y.
New Brunswick	P. A. Logan	P. A. Logan	Fredericton, N. B.
New Brunswick & Canada	Tho. Armstrong	G. Houlton	St. Andrew's, N. B.
New Haven & Northampton	Henry Fox	John Sweeny	New Haven, Ct.
New Jersey & New York	J. S. Drake		Jersey City, N. J.
New Jersey Southern	Rufus Blodgett		Manchester, N. J.
New Orleans, Texas & Mobile	§Josiah Bettis		Mobile, Ala.
New York, Lake Erie & Western	§§F. M. Wilder		Susquehanna, Pa.
New York, Lake Erie & Western	J. H. Vreeland		Jersey City, N. J.
New York, Lake Erie & Western		J. N. Mileham	Jersey City, N. J.
New York, Lake Erie & Western	J. Van Vechten	J. Van Vechten	Port Jervis, N. Y.
New York, Lake Erie & Western	V. Blackburn		Susquehanna, Pa.
New York, Lake Erie & Western		D. B. Goodell	Elmira, N. Y.
New York, Lake Erie & Western	George H. Griggs		Hornellsville, N.Y.
New York, Lake Erie & Western	Chas. O. Vedder	M. Wilder	E. Buffalo, N. Y.
New York, Lake Erie & Western	Jos. Beadt		Rochester, N. Y.
New York, Lake Erie & Western	Theo. Wheeler		New York, N. Y.
New York & Harlem		C. E. Garey	Morrisania, N. Y.
New York Central & Hud. River		††Leander Garey	New York, N. Y.
New York Central Division	§§G. B. Van Vorst	D. Holt	West Albany, N.Y.
New York Central Division	§§Henry Watkeys		Syracuse, N. Y.
New York Central Division	§Amos Gould		E. Buffalo, N. Y.
New York Central Division	§§S. L. White	Richard Donaby	Niagara Falls, N.Y.
New York Central Division		E. A. Olmstead	E. Buffalo, N. Y.
Hudson River Division	§§Wm. Buchanan	Peter Smith	New York, N. Y.
New York Central Division		C. H. Burchard	E. Rochester, N.Y.
New York, Ontario & Western	Edw. Minshull	Edw. Minshull	Middletown, N. Y.
New York & New England	§§Geo. E. Boyden	Elias E. Pratt	Boston, Mass.
Norwich & Worcester Div	Richard Colburn		Norwich, Ct.
Hartford Division	E. M. Humstone	S. Howland	Hartford, Conn.
New York, N. Haven & Hartford	§§D. Kettendorf	James Denver	New Haven, Ct.
Hartford Division	§Jno. Heaney, Jr.	L. Packard	Hartford, Ct.
New York, Penn. & Ohio	‡William Fuller	Wm. Fuller	Cleveland, O.
New York, Penn. & Ohio	J. A. Cooper	D. S. Dockstader	Meadville, Pa.
New York, Penn. & Ohio	N. Wright	W. G. Huggard	Cleveland, C.
New York, Penn. & Ohio		S. V. Smith	Kent, O.
New York, Penn. & Ohio	William Hill	J. W. Holmes	Galion, O.
New York, Penn. & Ohio		J. T. Fosdick	Salamanca, N. Y.
New York, Penn. & Ohio		Geo. Wilson	Dayton, O.
New York, Providence & Boston	J. H. Anderson	J. H. Anderson	Providence, R. I.
Northern Central	§§R. H. Soule	G. W. Demarest	Baltimore, Md.
Northern Central	J. M. Coale		Baltimore, Md.
Northern Central	James Strode	J. C. Dyott	Elmira, N. Y.
Northern New Hampshire	**Jas. N. Lauder		Concord, N. H.
Northern of Canada	Peter Clark	Peter Clark	Toronto, Can.
Northern Pacific	**A. P. Farrar	A. P. Farrar	Brainerd, Minn.
Dakota Division	A. Rupert		Fargo, Dak.
Pacific & P. Oreille Div	C. Z. Sanders	Tho. G. Davis	New Tacoma, W.T.
Northeastern		W. H. Day	Florence, S. C.
North Pacific Coast	James Walch		Saucelito, Cal.
Northern & Northwestern	P. Clark		Toronto, Can.

O

Ogdensburg & Lake Champlain	Abraham Klohs	A. Klohs	Malone, N. Y.
Ohio Central	J. B. Morgan		Bucyrus, O.
Ohio & Mississippi	‡J. F. Sechler		Vincennes, Ind.
Ohio & Mississippi		J. P. Coulter	Aurora, Ind.
Cincinnati Division	John Thumser		Seymour, Ind.
Springfield Division	E. K. Sechler		Pana, Ill.
Old Colony	J. K. Taylor	A. Gleason	Boston, Mass.
B. C. F. & N. Bedford Div	Geo. W. Reynolds	Sam. Stevens	Taunton, Mass.
Olean, Bradford & Warren	Chas. Turner	Chas. Turner	Olean, N. Y.
Oregon & California	§§J. Brandt		Portland, Oregon.
Oregon Railway & Navigation Co	J. F. Curtis	Chas. Phipps	The Dalles, Oregon

P

Paducah & Elizabethtown	W. D. Robb	W. D. Robb	Elizabethtown, Ky
Painesville & Youngstown	J. H. Jones		Painesville, O.
Panama	Thos. S. O'Brien		Aspinwall, U. S. C.
Parker & Karns City	Philip Davies	Wm. Wolford	Parker City, Pa.
Pensacola & Selma	R. H. Kelly		Selma, Ala.
Pennsylvania	§§T. N. Ely		Altoona, Pa.
Pennsylvania	H. D. Garrett	I. W. Van Houten	W. Philadelphia, Pa
Pennsylvania	E. L. Caum	Samuel W. Myers	Harrisburg, Pa.
Pennsylvania	G. W. Strattan	John P. Levan	Altoona, Pa.
Pennsylvania	D. O. Shaver	J. G. Stewart	Pittsburg, Pa.
New Jersey Division	L. A. Bosdevex	S. F. Bevex	Meadowshops, N.J
New Jersey Division		David H. Baker	Jersey City, N. J.
New Jersey Division	§§H. S. Hayward		Jersey City, N. J.
New Jersey Division	Tho. Kerr	P. S. Bogart	So. Amboy, N. J.
New Jersey Division	R. McDowell		Lambertville, N. J
New Jersey Division	W. McAlister		Camden, N. J.
West Penn. Division	C. B. Street	M. H. Fails	Blairsville, Pa.
Peoria, Decatur & Evansville	P. Reilly		Pekin, Ill.
Peoria & Jacksonville	R. F. Hurd	R. F. Hurd	Pekin, Ill.
Peoria & Springfield	E. Dejzerdt	E. Dejzerdt	Peoria, Ill.
Petersburg	R. B. Andrew	J. W. Fleming	Petersburg, Va.
Philadelphia, Wilmington & Balt	S. A. Hodgman	Wm. Lungren	Wilmington, Del
Philadelphia & Atlantic City	J. W. Wright	E. Lippincott	Camden, N. J.
	§§Howard Fry		Williamsport, Pa.
	W. F. Beardsley		Sunbury, Pa.
	W. L. Forster		Renovo, Pa.
	W. L. Holman		Kane, Pa.
	W. T. Smith		Erie, Pa.
Philadelphia & Erie	S. D. Danfield	S. D. Danfield	Chester, Pa.
Philadelphia & Baltimore Central	T. B. Paxson	John H. Rankin	Reading, Pa.
Philadelphia & Reading	W. H. Ellis	C. D. Ellis	Catawissa, Pa.
Catawissa Branch	Jackson Richards		Philadelphia, Pa.
Germantown & Norris'n Div	Jackson Richards	C. W. Hammann	Philadelphia, Pa.
North Penn. Division	Jackson Richards		Philadelphia, Pa.
Del. & Bound Brook Div	§R. D. Wade		Richmond, Va.
Piedmont Air Line	Rich. & Danville Div	J. B. Vaughan	Richmond, Va.
North Carolina Div		J. C. Holt	Comp. Shops, N. C.
Pittsburg, Cincinnati & St. Louis	§§G. W. Rhodes		Columbus, O.
Little Miami Division	J. H. Setchel	John McVay	Cincinnati, O.
Little Miami Division		M. P. Ford	Columbus, O.
Col., Cin. & Ind. Division	Robert Curtis	Tho. Chamberlin	Columbus, O.
Col., Cin. & Ind. Div	Geo. H. Prescott	Chas. H. Starr	Logansport, Ind.
Col. Cin. & Ind. Division	C. M. St. Clair		Indianapolis, Ind.
Cin. & Musk. Val. Division	Leroy Kells	Danie Jewell	Lancaster, O.
Pitts. Cin. & St. Louis Div'n	Ross Kells		Dennison, O.
Pitts. Cin. & St. Louis Divis'n		A. K. Mansfield	Steubenville, O.
Pittsburg, Fort Wayne & Chicago	Geo. J. Parkin	John Marquis	Allegheny, Pa.
Pittsburg, Fort Wayne & Chicago	J. M. Boon	Israel Lee	Fort Wayne, Ind
Pittsburg, Fort Wayne & Chicago		J. J. Kirkland	Crestline, O.
Pittsburg, Titusville & Buffalo	H. J. Bookhammer	John Monks	Oil City, Pa.
Pittsburg, Virginia & Charleston	Wm. Limager		Pittsburg, Pa.
Pittsburg & Lake Erie	S. W. Haines		Pittsburg, Pa.
Portland & Ogdensburg	Geo. H. Poor	W. G. Brewer	Portland, Me.
Portland & Rochester	E. H. C. Tompson	David Dow	Portland, Me.
Port Dover & Lake Huron	H. M. Aldrich		Woodstock, Ont.
Port Royal & Augusta	Geo. Riley	J. H. Milton	Port Royal, S. C.
Poughkeepsie, Hartford & Boston	John L. Driscoll		Poughkeepsie, N.Y.
Prince Edward Island	A. Stronach	D. M. Fraser	Charlottet'n, P. E.I
Providence & Springfield	G. T. Richardson		Pascoag, R. I.
Providence & Worcester	A. Griggs	A. Griggs	Providence, R. I.
Providence, Warren & Bristol	Rufus Smith	Rufus Smith	Bristol, R. I.

Q

Quebec, Mont., Ottawa & Occidental	‡A. Davis		Montreal, Can
Quincy, Missouri & Pacific			Kirksville, Me.

R

Raleigh & Augusta Air-Line	**B. R. Harding		Raleigh, N. C.
Raleigh & Gaston	**B. R. Harding	R. T. Bishop	Raleigh, N. C.
Rhinebeck & Connecticut	John Dykeman	John H. Decker	Rondout, N. Y.
Rich., Fredericksburg & Potomac	H. Khun	W. H. Trainham	Richmond, Va.
Richmond & Allegheny	Geo. D. Harris		Richmond, Va.
Richmond & Danville	See Piedmont Air-Line.		
Richmond & Petersburg	John O'Brien	H. L. Carter	Richmond, Va.
Rich., York River & Chesapeake	A. B. Armstrong	A. B. Armstrong	Richmond, Va.
Rio Grande	G. W. Rendall	M. Markwood	Brownsville, Tex.
Rochester & State Line	A. J. Robbins		Rochester, N. Y.
Rock Island & Peoria	Joseph Elder		Peoria, Ill.
Rome, Watertown & Ogdensburg	Geo. H. Hazleton	Geo. H. Haz lton	Oswego, N. Y.
Rome, Georgia	O. W. Harbin	O. W. Harbin	Rome, Ga.

S

Saginaw Valley & St. Louis			St. Louis, Mich.
San Francisco & Northern Pacific	Ed. Reynolds	John Martin	Donahue, Cal.
Savannah, Florida & Western	§Charles Collins	P. N. Raynall	Savannah, Ga.
Savannah & Memphis	R. A. Bridges		Opelika, Ala.
Scioto Valley	C. H. Cory	C. H. Cory	Portsmouth, O.
Seaboard & Roanoke	§§M. M. Pendleton		Portsmouth, Va.
Selma, Rome & Dalton	H. J. Sitton	W. W. Pierce	Selma, Ala.
Selma, Marion & Memphis	J. M. Levis		Marion, Ala.
Sheboygan & Fond du Lac	John Hickey	John Hickey	Sheboygan, Wis.
Shenango & Allegheny	Edw. Richardson		Greenville, Pa.
Shepaug	C. M. Allen		Litchfield, Ct.
Sioux City & Pacific	C. H. Foster	C. H. Foster	Missouri Valley, Ia.
Sioux City & St. Paul	F. C. Butterfield	F. C. Butterfield	Shakopee, Minn.
Southern Pacific			
Northern Division	J. T. Wilson	F. N. Bellisle	San Francisco, Cal
Los Angeles & Yuma Div	Jas. Velsir	J. S. Young	Los Angeles, Cal.
Tulare Division	S. Johnson		Tulare, Cal.
South Carolina	§P. J. Cochrane	Geo. H. Gramling	Charleston, S. C
Southern Central	Chas. G. Brown	H. Mooney	Auburn, N. Y.
Southeastern (Canada)	Edwin Goss		Richford, Vt.
Southwestern of Georgia	D. M. Gugel	James A. Knight	Macon, Ga.
South Pacific Coast	E. L. Reese	Martin Carter	Newark, Cal.

Railroad.	*Master Mechanic.*	*Master Car-Builder.*	*Residence.*
Spartanburg, Union & Columbia	Wm. Platt	W. B. Brown	Spartanburg, S. C.
Spartanburg & Asheville	M. Fraser	W. B. Brown	Spartanburg, S. C.
Springfield, Athol & Northeastern	W. E. Granger		Springfield, Mass.
Springfield Southern	F. W. Johnstone		Springfield, O.
State Line & Sullivan	J. O. Blight		Towanda, Pa.
Stockton & Copperopolis	John M. Fulton		Stockton, Cal.
St. Croix & Penobscot	G. H. Corsen	H. C. Tincker	Milltown, Me.
St. Johns	Jas. M. Owens		St. Augustine, Fla.
St. Johnsbury & Lake Champlain	Geo. E. Howe		St. Johnsbury, Vt.
S. Joseph & Des Moines	F. A. Chase		St. Joseph, Mo.
St. Joseph & Western	E. Sleppy	E. Sleppy	So. St. Joseph, Mo
St. Lawrence & Ottawa	Calvin Dame	Calvin Dame	Prescott, Canada.
St. Louis, Iron Mount. & So.	**O. A. Haynes	Oscar Doolittle	St. Louis, Mo.
Arkansas Division	L. Finlay	L. Finlay	Little Rock, Ark.
Missouri Division	W. H. Harris		De Soto, Mo.
St. Louis, Alton & Terre Haute	**Beriah Warren		St. Louis, Mo.
St. Louis, Salem & Little Rock	Thomas Everson	A. W. Grosvernor	Steelville, Mo.
St. Louis & San Francisco	M. Kearney	M. Kearney	N. Springfield, Mo
St. Louis, Keokuk & Northwest'n	Wm. Foley		Keokuk, Iowa.
St. Louis Bridge Co. & Tunnel R.R.	H. M. Smith		St. Louis, Mo.
St. Paul & Duluth	W. McFarland	John Hill	St. Paul, Minn.
St. Paul, Minneapolis & Manitoba	A. A. Ackerly	J. C. Munro	St. Paul, Minn.
St. Paul & Sioux City	Matt Ellis		Shakopee, Minn.
Sussex	E. H. Osborn	R. L. Sutton	Newton, N. J.
Syracuse, Binghamton & N. Y.	James Buchanan	James Buchanan	Syracuse, N. Y.
Syracuse, Chenango & New York	Geo. W. West		Syracuse, N. Y.
T			
Tennessee & Pacific	William McKeand	William McKeand	Nashville, Tenn.
T. H. & Indianapolis (Vandalia Line)	§§C. R. Peddle	E. D. Carter	Terre Haute, Ind
Indianapolis Div. (Vandalia Line)	Clinton Idler		Indianapolis, Ind
Vandalia Div. (Vandalia Line)	Chas. Butler		Effingham, Ill.
Logansport Division	A. J. Prescott	H. L. Clark	Logansport, Ind.
Texas & New Orleans	E. A. Campbell		Houston, Texas.
Texas & Pacific	H. J. Small	F. M. Alexander	Marshall, Texas.
Brazos Division	D. E. Greve		Dallas, Tex.
Tioga	Pere Bonny	D. H. Stratton	Blossburg, Pa.
Toledo, Delphos & Burlington	F. M. Mast		Delphos, O.
Toronto, Grey & Bruce	†David Preston		Toronto, Can.
Toronto & Nipissing	J. Haggas		Toronto, Can.
Troy & Boston	Z. B. Davis	R. V. Coon	Troy, N. Y.
U			
Ulster & Delaware	J. B. Dykeman	Jno. H. Decker	Rondout, N. Y.
Union Pacific	§I. H. Congdon	‡‡Geo. E. Stevens	Omaha, Neb.
Eastern Division		A. M. Collett	Omaha, Neb.
Eastern Division		H. P. Makely	Grand Island, Neb
Mountain Division	T. A. Davis	John E. Davis	Cheyenne, Wg. T.
Laramie Division		Floyd Heavaner	Laramie, Wg. T.
Western Division		P. V. Brinkley	Evanston, Wg. T.
Colorado Division	James S. Scott	E. G. Thomas	Golden, Col.
Denver, S. Park & Pacific Div			Denver, Col.
Kansas Division	**John MacKenzie	J. B. Roberts	Kansas City, Mo.
Kansas Division	J. B. Daily		Ellis, Kan.
Utah Central	W. B. Armstrong	Sam. S. Tucker	Salt Lake City.
Utah Western	Robert Anderson		Salt Lake City, U.
Utica & Black River	John Bailey	David James	Utica, N. Y.
Utica, Ithaca & Elmira	Geo. W. Cleveland	F. W. Magargil	Breesport, N. Y.
V			
Valley	B. C. Bosworth	Chas. Blanchard	Cleveland, O.
Vicksburg & Meridian	Jas. B. Browne		Vicksburg, Miss.
Vicksburg, Shreveport & Pacific	W. Bell Smith	W. Bell Smith	Monroe, La.
Virginia & Truckee	I. N. Fording		Carson, Nev.
Virginia Midland	J. E. Waddey	J. T. Nallo	Alexandria, Va.
W			
Wabash, St. Louis & Pacific	Chauncy R. Morris		Fort Wayne, Ind
Wabash, St. Louis & Pacific	Jacob Johann	B. B. Rose	Springfield, Ill.
Wabash, St. Louis & Pacific	W. D. Hewitt	R. M. Hemphill	Peoria, Ill.
Wabash, St. Louis & Pacific		U. H. Kohler	Toledo, Ohio.
Wabash, St. Louis & Pacific		J. S. Hazen	Stanbery, Mo.
Wabash, St. Louis & Pacific	W. H. Selby	C. S. Buck	Moberly, Mo.
Wallkill Valley	John Dykeman	Jno. H. Decker	Rondout, N. Y.
Washington & Ohio	Edward Dunn	John Harrison	Alexandria, Va.
Welland	James Taylor	Wm. H. Pay	St. Catharine, C. W
Westchester & Philadelphia	§S. D. Danfield	S. D. Danfield	Chester, Pa.
Western & Atlantic	John H. Flynn	W. G. Grambling	Atlanta, Ga.
Western Maryland	§David Holtz	J. H. Nussear	Union Bridge, Md.
Western North Carolina	Geo. W. Gates		Salisbury, N. C.
Western, of Alabama	Robert King	F. M. Wade	Montgomery, Ala.
Western R. R. N. C.	Isaac W. Clark	Isaac W. Clark	Fayetteville, N. C.
Western Union	John Taylor	E. A. Eddy	Racine, Wis.
West Feliciana	J. A. Tilton	Wm. McKelvey	Laurel Hill, La.
West Jersey	W. McAllister	C. C. Williams	Camden, N. J.
White Water	§L. W. Wingert		Harrison, O.
Wilmington, Columbia & Augusta	John Bisset	W. H. Day	Florence, S. C.
Wilmington & Welden	John Bisset	C. R. Clowe	Wilmington, N. C.
Wisconsin Central	A. Tenwick	J. L. Adam	Stevens' P't, Wis.
Wisconsin Valley	M. B. Snyder		Tomah, Wis.
Worcester & Nashua	John G. Brady	John G. Brady	Worcester, Mass.

Directory of Railway Superintendents and Purchasing Agents

THROUGHOUT THE UNITED STATES AND CANADA.

REFERENCES.—* General Manager. † Managing Director. ‡ Assistant General Superintendent. § Assistant Superintendent. ** Superintendent of Transportation. §§ Assistant General Manager.

Railroad.	*Superintendent.*	*Purchasing Agent.*	*Residence.*
A			
Adirondack	C. E. Durkee		Saratoga, N. Y.
Alabama Central	John M. Bridges		Selma, Ala.
Alabama Great Southern	*John Scott	R. W. Healey	Chattanooga, Tenn.
Albany & Susquehanna	*C. F. Young		Honesdale, Pa.
Allegheny Valley	David McCargo	David McCargo	Pittsburg, Pa.
Anderson, Lebanon & St Louis	Jas. A. Larnerd		Anderson, Ind.
Arkansas Midland	*A. H. Johnson		Helena, Ark.
Ashtabula & Pittsburg	D. B. McCoy		Ashtabula, O.
Atchison, Topeka & Santa Fe	*W. B. Strong	F. M. Smith	Topeka, Kan.
Southern Division	A. A. Robinson		Las Vegas, N. M.
Eastern Division	D. J. Chase		Topeka, Kan.
Atlanta & Charlotte Air Line	*G. J. Foreacre	G. J. Foreacre	Atlanta, Ga.
Atlanta & West Point	*L. P. Grant		Atlanta, Ga.
Atlantic & North Carolina	A. B. Andrews		Newbern, N. C.
Atlantic & Pacific	F. W. Smith		Albuquerque, N. M.
Atlantic, Mississippi & Ohio	Geo. Hoffman	J. P. Minetree	Petersburg, Va.
Atlantic, Tennessee & Ohio	J. J. Gormley		Charlotte, N. C.
B			
Baltimore & Ohio	**W. M. Clements	N. S. Hill	Baltimore, Md.
Ohio & Chicago Division	C. H. Hudson		Chicago, Ill.
Pittsburg Division	G. M. Serpell		Connellsville, Pa.
Baltimore & Potomac	Geo. C. Wilkins	A. W. Sumner	Baltimore, Md.
Bangor & Piscataquis	Arthur Brown		Bangor, Me.
Bath & Hammondsport	M. H. Hall		Hamm'dsp't, N. Y.
Bedford, Sp'gville, Owensb'g & Bd.	Jas. W. Kennedy	Jas. W. Kennedy	Bedford, Ind.
Bellefonte & Snow Shoe	Daniel Rhoads		Bellefonte, Pa.
Bell's Gap	Robert G. Ford		Bellwood, Pa.
Bennington & Rutland	F. C. White	F. C. White	Rutland, Vt.
Blairstown	J. D. Vail		Blairstown, N. J.
Boston, Revere Beach & Lynn	E. H. Whorf		Boston, Mass.
Boston & Albany	*Wm. Bliss		Boston, Mass.
Boston & Albany	C. O. Russell		Springfield, Mass.
Boston & New York Air Line	Jos. H. Franklin		New Haven, Conn.
Boston & Providence	A. A. Folsom	A. A. Folsom	Boston, Mass.
Boston Concord & Montreal	*J. A. Dodge		Plymouth, N. H.
Boston, Concord & Montreal	§W. A. Stowell	J. Thomas Vose	Boston, Mass.
Boston, Hoosac Tunnel & Western	E. B. Burnham		Mechanicsville, N. Y.
Boston & Maine	J. T. Furber	J. T. Furber	Boston, Mass.
Boston & Lowell	A. A. Hobart	F. H. Nourse	Boston, Mass.
Boston, Barre & Gardner	H. M. Witter	H. M. Witter	Worcester, Mass.
Bradford, Bordell & Kinzua	B. C. Williams		Bradford, Pa.
Brooklyn, Flatbush & Coney Isl'd.	W. E. Dorwin		Brooklyn, N. Y.
Brunswick & Albany	R. D. Meader		Brunswick, Ga.
Burlington & Mo. River (in Neb.)	*A. E. Touzalin	G. Hargreaves	Omaha, Neb.
Burlington & Mo. River (in Neb.)	Geo. W. Holdrege		Omaha, Neb.
First Division	J. O. Phillipi		Lincoln, Neb.
Burlington, Cedar Rapids & Nor'n.	C. J. Ives	Rob't Williams	Cedar Rapids, Ia.
Burlington & Northwestern	John F. Gerry	John F. Gerry	Burlington, Ia.
Burlington & Southwestern	J. W. Smith	J. W. Smith	Burlington, Ia.
Buffalo & Southwestern	*John F. Moulton		Buffalo, N. Y.
Buffalo, New York & Philadelphia	Geo. S. Gatchell	J. H. Pool	Buffalo, N. Y.
C			
Cairo & St. Louis	Chas. Hamilton	Chas. Hamilton	St. Louis, Mo.
Cairo & Vincennes	Roswell Miller	T. W. Fitch	Cairo, Ill.
California Pacific & Northern	§J. A. Fillmore		Sacramento, Cal.
Camden & Atlantic	F. A. Lister	F. A. Lister	Camden, N. J.
Canada Central	*Archer Baker		Brockville, Can.
Canada Southern	*Wm. P. Taylor		Buffalo, N. Y.
Canada Southern		A. F. Howland	St. Thomas, Ont.
U. S. Division	E. P. Murray		Toledo, O.
Canada Division	W. E. Carroll		St. Thomas, Ont.
Canadian Pacific	J. F. Lynskey		Winnepeg, Man.
Carbondale & Shawneetown	R. J. Cavett		Carbondale, Ill.
Carolina Central	V. Q. Johnson	C. H. Roberts	Wilmington, N. C.
Catasauqua & Fogelsville	C. W. Chapman	C. W. Chapman	Catasauqua, Pa.
Cayuga Southern	W. Stevenson		Sayre, Pa.
Cayuga & Susquehanna	W. R. Humphreys		Ithaca, N. Y.
Cazenovia, Canastota & De Ruyter	John Stebbins		Cazenovia, N. Y.
Central Pacific	*A. N. Towne		San Francisco, Cal.
Central Pacific	J. A. Fillmore		San Francisco, Cal.
Central Pacific		J. R. Watson	Sacramento, Cal.
Western & Visalia Divisions	A. D. Wilder		Oakland, Cal.
Truckee Division	Frank Free		Wadsworth, Nev.
Humboldt Division	G. W. Coddington		Carlin, Nev.
Salt Lake Division	A. G. Fell		Ogden, Utah.
Sacramento & Oregon Div	R. H. Pratt		Sacramento, Cal.
Central Vermont	J. W. Hobart		St. Albans, Vt.
Central Vermont	‡J. M. Foss		St. Albans, Vt.
Western Division	John Schrier		Ogdensburg, N. Y.
Northern Division	J. B. Futooys		St. Johns, P. Q.
Rutland Division	J. Burdett		Rutland, Vt.
New London Northern	G. W. Bentley	G. W. Bentley	New London, Conn.
Central of Georgia	Wm. Rogers	Henry Yonge	Savannah, Ga.
Atlanta Division	W. F. Shellman		Macon, Ga.
Central of Iowa	D. N. Pickering	D. N. Pickering	Marshalltown, Ia.
Central of New Jersey	James Moore	B. W. Burnet	Elizabeth, N. J.
Central Division	‡W. W. Stearns		Elizabeth, N. J.
Lehigh & Susq. Division	W. S. Polhemus		Mauch Chunk, Pa.
Champaign, Havana & Western	A. H. Wood		Urbana, Ill.
Charleston & Savannah	C. S. Gadsden		Charleston, S. C.
Charlotte, Columbia & Augusta	G. R. Talcott	G. R. Talcott	Columbia, S. C.
Chesapeake & Ohio	W. M. S. Dunn	J. A. Netherland	Richmond, Va.
Cheraw & Darlington	J. F. Divine		Society Hill, S. C.
Cherokee	John Postell		Atlanta, Ga.
Cheshire	*R. Stewart	H. H. Stone	Keene, N. H.
Chester & Lenoir	James Mason		Chester, S. C.
Chicago & Northwestern	*Marvin Hughitt	R. W. Hamer	Chicago, Ill.
Chicago & Northwestern			Chicago, Ill.
Chicago & Northwestern	§Chas. C. Wheeler		Chicago, Ill.
Wisconsin & Mill. Division	E. J. Cuyler		Chicago, Ill.
Peninsula Division	W. B. Lindsay		Escanaba, Mich.
Madison Division	C. A. Swineford		Baraboo, Wis.
Galena Division	Chas. Murray		Chicago, Ill.
Des Moines & Iowa Division	J. M. Whitman		Clinton, Iowa.
Winona & St. Peter Division	S. Sanborn		Winona, Minn.
Dakota Central Division	T. J. Nichols		Huron, Dak.
Galena & Wisconsin Br	J. B. Trull		Galena, Ill.
Chicago & Alton	*J. C. McMullen	A. V. Hartwell	Chicago, Ill.
Chicago & Alton	C. H. Chappell		Bloomington, Ill.
Chicago Division	A. M. Richards		Chicago, Ill.
Kansas City St. Louis Div	O. Vaughan		Mexico, Mo.
Chicago & Block Coal	*A. F. Beach		Veedersburg, Ind.
Chicago, Burlington & Quincy	*Thos. J. Potter	Wm. Irving	Chicago, Ill.
Chicago, Burlington & Quincy	§John D. Besler		Galesburg, Ill.
Chicago, Burlington & Quincy	§E. Ryder		Chicago, Ill.
Middle, Galesb'g & Q'y Div	H. Hitchcock		Galesburg, Ill.
St. Louis & R. Isl'd Division	W. R. Crumpton		St. Louis, Mo.
Iowa Division	W. C. Perkins		Burlington, Iowa.
Chi., Clinton, Dubuque & Minn	*F. O. Wyatt	F. O. Wyatt	Dubuque, Iowa.
Chicago & Eastern Illinois	O. S. Lyford	O. S. Lyford	Chicago, Ill.
Chicago & Iowa	W. H. Holcomb, *Rec*		Rochelle, Ill.
Chicago & Northeastern	J. M. Turner		Lansing, Mich.
Chicago & Pacific	*J. M. Whitman	James Penny	Chicago, Ill.
Chicago & Paducah	D. H. Conklin		Streator, Ill.
Chicago & Paducah		C. L. Rising	Chicago, Ill.
Chicago, St Louis & New Orleans	*J. C. Clarke	J. C. Febiger, Jr	New Orleans, La.
South Division	W. P. McKinley		McComb City, Miss.
North Division	J. G. Mann		Jackson, Tenn.
Chicago, Rock Island & Pacific	A. Kimball		Davenport, Iowa.
Chicago, Rock Island & Pacific	‡A. Manvel	A. Manvel	Chicago, Ill.
Southwestern Division	G. F. Walker		Trenton, Mo.
Iowa Division	H. F. Royce		Des Moines, Iowa
Illinois Division	R. H. Chamberlin		Chicago, Ill.
Keokuk & Des Moines Div	John Givin		Keokuk, Ia.
Chicago & West Michigan	§C. M. Lawler		St. Joseph, Mich.
Chicago, Milwaukee & St. Paul	W. C. Van Horne	J. T. Crocker	Milwaukee, Wis.
Ch., LaCrosse & P. du C. Div.	H. C. Atkins		Milwaukee, Wis.
Northern Division	L. B. Rock		Milwaukee, Wis.
I. & M., & I. D. Division	C. H. Prior		Minneapolis, Minn.
Wabasha Division	J. H. Lakey		Wabasha, Minn.
Western Union Division	D. A. Olin		Racine, Wis.
Sioux City & Dak. Div	G. E. Merchant		Sioux City, Ia.
Southern Minnesota Div	J. M. Egan	J. M. Egan	La Crosse, Wis
Chicago, Pekin & Southwestern	J. Murray	A. H. Cook	Chicago, Ill.
Chicago, St. Paul & Minneapolis	E. W. Winter	W. H. S. Wright	St. Paul, Minn.
Chicago & Grand Trunk	Henry Funnell		Battle Creek, Mich.
Chicago & Grand Trunk		N. Wall	Fort Gratiot, Mich.
Chippewa Falls & Western	L. C. Stanley		Chip'wa F'lls, Wis.
Cincinnati & Eastern	George H. Wilber		Batavia, O.
Cincinnati, Wabash & Michigan	*Norman Beckley	Norman Beckley	Elkhart, Ind.
Cincinnati, Wabash & Michigan	O. W. Lamport		Wabash, Ind.
Cincinnati, Richmond & Chicago	*Lewis Williams		Cincinnati, O.
Cincinnati, Rockp't & Southwest'n	H. C. Branham	H. C. Branham	Rockport, Ind.
Cincinnati & Terre Haute	John Holland		Terre Haute, Ind.
Cin., Cumber'd Gap & Charleston	W. J. Taylor		Knoxville, Tenn.
Cincinnati, Hamilton & Dayton	*Lewis Williams	Lewis Williams	Cincinnati, O.
Cin., Hamilton & Indianapolis	Lewis Williams		Cincinnati, O.
Cin., Sandusky & Cleveland	*D. W. C. Brown	Frank Herriman	Sandusky, O.
Cincinnati Southern	Sam'l Woodward	Julius Uihlein	Cincinnati, O.

Railroad.	*Superintendent.*	*Purchasing Agent.*	*Residence.*
Cin., Indianapolis, St. Louis & Chi	J. W. Sherwood		Indianapolis, Ind
Cin., Indianapolis, St. Louis & Chi		George Tozzer	Cincinnati, O.
Cleve , Col., Cin. & Indianapolis	*E. B. Thomas	J. L. Yale	Cleveland, O.
Indianapolis Division	C. C. Gale		Indianapolis, Ind
Col. and Cincinnati Divs	Robert Blee		Cleveland, O.
Cleveland & Marietta	S. C. Baldwin	R. B. Hoover	Marietta, Ohio.
Cleveland & Pittsburg	John Thomas		Cleveland, O.
Cleveland & Pittsburg	*J. D. Layng	Wm. Mullins	Pittsburg, Pa.
Cleveland, Mt. Vernon & Columb's	G. A. Jones		Mt. Vernon, O.
Cleve., Tuscarawas Val. & Wheel.	*Oscar Townsend		Cleveland, O.
Cobourg, Petersboro & Marmora	James R. Barber	J. R. Barber	Cobourg, Ont.
Columbia & Greenville	*T. M. R. Talcott		Richmond, Va
Columbus & Hocking Valley	Orland Smith		Columbus, O.
Columbus & Toledo	Orland Smith	Geo. R. Carr	Columbus, O.
Columbus & Rome	T. J. Nuckolls		Columbus, Ga.
Concord & Claremont	George E. Todd		Concord, N. H.
Concord	H. E. Chamberlin	H. E. Chamberlin	Concord, N. H.
Concord & Portsmouth	H. E. Chamberlin		Concord, N. H.
Connecticut Central	D. D. Warren, Pres		Springfield, Mass.
Connecticut River	John Mulligan	John Mulligan	Springfield, Mass.
Connecticut Valley	Samuel Babcock		Hartford, Conn.
Connecticut Western	J. F. Jones		Hartford, Conn.
Connecticut & Passumpsic Rivers	H. E. Folsom		Lyndonville, Vt.
Corning, Cowanesque & Antrim	A. H. Gorton	Andrew Beers	Corning, N. Y.
Covington, Col. & Black Hills	J. I. Booge		Sioux City, Iowa.
Credit Valley	H. G. Taylor		Toronto, Ont.
Cumberland Valley	J. F. Boyd	O. N. Lull	Chambersburg, Pa.
Cumberland & Pennsylvania	Y. L. Burwell	P. L. Burwell	Cumberland, Md.
Cumberland & Maurice River	L. H. Downey		Port Norris, N. J.

D

Danbury & Norwalk	L. W. Sandiforth		South Norwalk, C
Danville & Southwestern	James A. Eads		Paris, Ill.
Davenport & Northwestern	D. Flanigan		Davenport, Ill.
Dayton & Michigan	E. E. Dwight		Toledo, O.
Dayton & Union	C. C. Gale		Indianapolis, Ind.
Dayton & Southeastern	J. E. Gimperling, *Rec*	E. F. Pryor	Dayton, O.
Delaware & Chesapeake	O. S. Sanford		Easton, Md.
Delaware & Hudson Canal Co	R. Manville	R. Manville	Carbondale, Pa.
Delaware & Hudson Canal Co	*C. F. Young		Honesdale, Pa.
Albany & Susq. Division	C. D. Hammond		Albany, N. Y.
Rensselaer & Saratoga Div	Theo. Voorhees		Troy, N. Y.
Delaware, Lackawanna & Western		G. W. B. Cushing	New York City.
Delaware, Lackawanna & Western	W. F. Hallstead		Scranton, Pa.
Bloomsburg Division	G. Bogart		Scranton, Pa.
Morris & Essex Division	Andrew Reasoner		Hoboken, N. J.
Oswego & Syracuse Division	W. B. Phelps		Oswego, N. Y.
Utica, Chenango & Sus. Div.	W. G. Oakman		Scranton, Pa.
Delaware Western	David Connell		Wilmington, Del.
Denver & Rio Grande	*D. C. Dodge		Denver, Col.
Denver & Rio Grande	George W. Cushing		Denver, Col.
Denver & Rio Grande		A. B. Garner	Colorado Spr's, Col.
First Division	W. W. Hungerford		Denver, Col.
Second Division	E. R. Dougherty		La Veta, Col.
Des Moines, Northwestern	C. N. Gilmore		Des Moines, Iowa.
Des Moines & Ft. Dodge	C. N. Gilmore	C. N. Gilmore	Des Moines, Iowa.
Detroit & Bay City	S. R. Callaway	Allan Bourn	Detroit, Mich.
Detroit, Gr. Haven & Milwaukee	W. J. Morgan	John S. Lorimer	Detroit, Mich.
Detroit, Hillsdale & Southwestern	W. F. Parker		Ypsilanti, Mich.
Detroit, Lansing & Northern	J. M. Fish	Allan Bourn	Detroit, Mich.
Dorchester & Delaware	Tho. E. Wright		Cambridge, Md.
Dunkirk, Allegheny Val. & Pitts	D. Thayer		Dunkirk, N. Y.
Dunkirk, Allegheny Val. & Pitts		R. C. Moore	New York City.

E

East Broad Top	A. W. Sims		Orbisonia, Pa.
East Alabama	W. W. Barnes		Opelika, Ala.
East Line & Red River	J. B. Wheat		Jefferson, Tex.
East Tenn., Virginia & Georgia	**J. F. O'Brien	J. F. O'Brien	Knoxville, Tenn.
Eastern	**D. W. Sanborn	Geo. J. Fisher	Boston, Mass.
Eastern Kentucky	*H. W. Bates	H. W. Bates	Riverton, Ky.
Eastern Shore	W. Thompson		Prince Anne, Md.
Erie & Pittsburg	J. M. Kimball		Erie, Pa.
Erie & Pittsburg	*J. D. Layng	Wm. Mullins	Pittsburg, Pa.
Eureka & Palisade	P. Evarts		Palisade, Nev.
European & North American	F. W. Cram		Bangor, Maine.
Evansville & Terre Haute	J. E. Martin	Jno. L. White	Evansville, Ind.

F

Fitchburg	John Adams	F. S. Pratt	Boston, Mass.
Vermont & Mass. Div	‡E. K. Turner		Fitchburg, Mass
Flint & Pere Marquette	Sanford Keeler	G. G. Cook	E Saginaw, Mich.
Florida Central	W. M. Davidson	W. M. Davidson	Jacksonville, Fla.
Flushing, North Shore & Central	Samuel Spencer	Samuel Spencer	L'g Isl'd C'y, N. Y.
Fonda, Johnstown & Gloversville	L. Caten		Gloversville, N. Y.
Fon du Lac, Amboy & Peoria	A. Kinyon		Fond du Lac, Wis.
Fort Madison & Northwestern	S. B. Kenrick	S. B. Kenrick	Fort Madison, Ia.
Fort Wayne & Jackson	M. D. Woodford	M. D. Woodford	Jackson, Mich.
Fort Wayne, Muncie & Cincinnati	W. Worthington	& P. Ag't.	Fort Wayne, Ind.
Foxburg, St. Petersburg & Clarion	Benj. B. Newton		Foxburg, Pa.
Frankfort & Kokomo	J. B. Clark	E. H. Andress	Lafayette, Ind.
Fredericton	F. B. Edgecombe		Fredericton, N. B.
Freehold & New York	J. E. Ralph	* J. E. Ralph	Freehold, N. J.

G

Gal., Harrisburg & San Antonio	James Converse		Houston, Texas.
Gal., Houston & Henderson	*W. H. Harding	W. H. Harding	Palestine, Texas.
Geneva, Ithaca & Sayre	Wm. Stevenson		Sayre, Pa.
Georgia	S. K. Johnson	S. K. Johnson	Augusta, Ga.
Grand Haven	*F. H. May	F. H. May	Allegan, Mich.
G. Rapids, Newaygo & L. Shore	C. Warner		G. Rapids, Mich.
Grand Rapids & Indiana	W. O. Hughart, Pres't	W. R. Shelby	G. Rapids, Mich.
Northern Division	J. M. Matheany		G. Rapids, Mich.
Southern Division	P. S. O'Rourke		Fort Wayne, Ind.
Grand Trunk	*J. Hickson	John Taylor	Montreal, Canada.
Grand Trunk	W. J. Spicer		Montreal, Canada.
Grand Tower & Carbondale	T. M. Williamson	Wm. W. Harris	Grand Tower, Ill.
Grayville & Mattoon	*G. L. Bradbury		Mattoon, Ill.
Grayville & Mattoon	G. R. Cobleigh		Mattoon, Ill.
Great Western (Canada)	Charles Stuff		Hamilton, Ont.
Great Western (Canada)		G. R. Nash	London, Ont.
Green Bay & Minnesota	*Timothy Case		Green Bay, Wis.
Greenville, Col. & Birmingham	E. P. Buell		Greenville, Miss.
Greenwich & Johnsonville	J. H. Thompson		Greenwich, N. Y.
Gulf, Colorado & Santa Fé	*John Sealey	F. P. Killien	Galveston, Texas.
Gulf, Western Texas & Pacific	M. D. Monserrate		Cuero, Texas.

H

Hamilton & Northwestern	*F. W. Cumberland		Hamilton, Ont.
Hannibal & St. Joseph	W. R. Woodard	T. L. Dunn	Hannibal, Mo.
Eastern Division	W. R. Woodard		Hannibal, Mo.
Western Division	W. C. Alberger		Kansas City, Mo.
Hanover Junction & Gettysburg	Henry A. Young	H. A. Young	Hanover, Pa.
Harlem Extension South	*H. C. Root		Bennington, Vt.
Havana, Rantoul & Eastern	H. E. Bullock	H. E. Bullock	Rantoul, Ill.
Housatonic	L. B. Stillson		Bridgeport, Conn.
Houston, East & West Texas			Houston, Texas.
Houston & Texas Central	A. H. Swanson	A. H. Swanson	Houston, Texas
Southern Division	M. G. Howe		Corsicana, Texas.
Northern Division	G. A. Quinlan		Houston, Texas
Huntingdon & Broad Top	Geo. F. Gage	S. B. Knight	Huntingdon, Pa.

I

Illinois Central	E. T. Jeffrey	O. Ott	Chicago, Ill.

Railroad.	*Superintendent.*	*Purchasing Agent.*	*Residence.*
Chicago Division	C. A. Beck		Centralia, Ill.
Northern Division	J. C. Jacobs		Amboy, Ill.
Iowa Division	D. W. Parker		Dubuque, Ia.
Springfield Division	T. J. Hudson		Springfield, Ill.
Illinois Midland	L. Genis, *Rec*	J. G. Clifford	Terre Haute, Ind.
Illinois & St. Louis	C. H. Sharman		St. Louis Mo.
Indiana, Bloomington & Western	§§C. E. Henderson	H. C. Norton	Indianapolis, Ind.
Indianapolis, Decatur & Spring	E. H. Goodrich	E. H. Goodrich	Indianapolis, Ind.
Indianapolis & St. Louis	C. C. Gale	H. W. Comstock	Indianapolis, Ind.
Indianapolis, Peru & Chicago	§§E. C. Murphy		Indianapolis, Ind.
Indianapolis, Peru & Chicago		John Mc Kenna	Peru, Ind.
Indianapolis & Vincennes	J. J. Turner		Indianapolis, Ind
Intercolonial	D. Pottinger	T. V. Cooke	Moncton, N. B.
Halifax & St. John Division	Jas. Coleman		Truro, N. S.
Northern Division	M. Busby		Campbell'n, N. B.
International & Great Northern	*H. M. Hoxie	H. M. Hoxie	Galveston, Texas.
Iowa Eastern	H. H. Kerr		Beulah, Iowa.

J

Jacksonville, N. Western & S. E.	E. S. Greenleaf		Jacksonville, Ill.
Jacksonville, Pen. & Mobile		J. D. Hollister	Tallahassee, Fla.
Jeff., Madison & Indianapolis	E. W. McKenna		Louisville, Ky.
Jeff., Madison & Indianapolis		Wm. Mullins	Pittsburg, Pa.
Junction & Breakwater	Tho. Grcome		Lewes, Del.

K

Kansas Central	W. A. Martin	W. A. Martin	Leavenworth, Kan.
Kan. City, Burlington & Santa Fe	James Houston		Burlington, Kan.
Kansas City, Fort Scott & Gulf	L. W. Towne	H. P. Jacques	Kansas City, Mo.
Kansas City, Lawrence & South	L. W. Towne	H. P. Jacques	Kansas City, Mo.
Kan. City, St. Joseph & C. Bluffs	J. F. Barnard		St. Joseph, Mo.
Kansas Pacific	*S. H. H. Clark	A. D. Clark	Omaha, Neb.
Kansas Pacific	S. T. Smith		Kansas City, Mo.
Kaw Valley Division	J. O. Brinkerhoff		Kansas City, Mo.
Smoky Hill Division	J. T. Odell		Ellis, Kansas.
Denver Division	J. T. Odell		Denver, Col.
Cheyenne Division	A. A. Egbert		Denver, Col.
Kent Co. & Smyrna & Del. Bay	J. F. Bingham		Chestertown, Md.
Kentucky Central	J. R. Ledyard		Covington, Ky.
Kingston & Pembroke	R. W. Folger	Wm. Harty	Kingston, Can.
Knox & Lincoln	C. A. Coombs	C. A. Coombs	Bath, Maine.
Knoxville & Ohio	G. J. Kinzel		Knoxville Tenn.

L

Lake Erie & Western	*E. H. Waldron	E. H. Andress	Lafayette, Ind.
Sandusky Division	D. S. Hill		Fremont, Ohio.
Bloomington Division	M. Clark		Lafayette, Ind.
Lake Ontario Southern	*Jas. E. Briggs		Newark, N. Y.
Lake Shore & Mich. Southern	*John Newell		Cleveland, Ohio.
Lake Shore & Mich. Southern	Charles Paine	A. C. Armstrong	Cleveland, Ohio.
Buffalo & Erie Division	C. B. Couch		Cleveland. Ohio.
Toledo Division	Thos. Flesher, Jr		Toledo, Ohio.
Michigan Division	J. E. Curtis		Detroit, Mich.
Detroit Division	T. J. Charlesworth		Chicago, Ill.
Western Division	J. H. Parsons		Lansing, Mich.
Lansing Division	W. H. Caniff		Stonehouse, Pa.
Franklin Division	Geo. H. McIntire		Bethlehem, Pa.
Lehigh Valley	Robert H. Sayre		Philadelphia, Pa.
Lehigh Valley		L. Chamberlin	Mauch Chunk, Pa.
Beaver Meadow Division	A. G. Brodhead, Jr		Mauch Chunk, Pa.
Mahanoy Division	James I. Blakslee		Metuchen, N. J.
New Jersey Division	H. E. Packer		Wilkesbarre, Pa.
Wyoming Division	A. Mitchell		Quebec, Can.
Levis & Kennebec	W. C. Hall		East Liberty, Pa.
Ligonier Valley	Thos. A. Mellon		Little Rock, Ark.
Little Rock & Fort Smith	T. Hartman		Pine Bluff, Ark.
Little Rock, Miss. River & Texas	J. A. Woodson	J. A. Woodson	Los Angeles, Cal.
Los Angeles & Independence	$W. J. L. Moulton		L'g Isla'd C'y, N. Y.
Long Island	Austin Corbin, *Rec*		Lake Charles, La.
Louisiana Western	G. W. Polk		Louisville, Ky.
Louisville & Nashville	*F. de Funiak		Louisville, Ky.
Louisville & Nashville	D. W. C. Rowland	G. C. Breed	Evansville, Ind.
St. L. & S. E. & N. & D. Div.	James Montgomery	J. N. McCoy	Memphis, Tenn.
Memphis Line	J. T. Harrahan		Nashville, Tenn.
Nashville & Decatur Div	James Geddes		Birmingham, Ala.
So. & North Ala. Division	B. Dunham		Louisville, Ky.
Louisville, Cincinnati & Lexington	W. M. Mahl	Wm. Mahl	Louisville, Ky.
Louisville, New Albany & Chicago	John McLeod	Wm. M. Lewis	Louisville, Ky.
Louisville, N. Albany & St. Louis	H. L. Shepherd		New Albany, Ind.

M

Macon & Brunswick	Jas. M. Edwards	W. C. Jones	Macon, Ga.
Maine Central	Payson Tucker		Portland, Me.
Manchester & Lawrence	H. E. Chamberlin		Concord, N. H.
Manchester & North Weare	H. E. Chamberlin		Concord, N. H.
Manhattan Beach	A. Corbin, *Pres't.*		New York, N. Y.
Manhattan Elevated	§§Frank K. Hain		New York, N. Y.
Manhattan Elevated	C. L. Green		Cincinnati, O.
Marietta & Cincinnati	Jas. H. Stewart.	J. H. Stewart	Marquette, Mich.
Marquette, Houghton & Ontonag'n	*Samuel Schoch	R. M. McCauley	Smethport, Pa.
McKean & Buffalo	S. V. Godden		Memphis, Tenn.
Memphis & Little Rock	*Wm. E. Smith		Memphis, Tenn.
Memphis & Little Rock	E. K. Sibley		Huntsville, Ala.
Memphis & Charleston	John A. Grant	John A. Grant	Paducah, Ky.
Memphis, Paducah & Northern	*N. Monsarrat	N. Monserrat	Romeo, Mich.
Michigan Air Line	*M. S. Hadley		Detroit, Mich
Michigan Central	*H. B. Ledyard	Allan Bourn	Jackson, Mich.
Michigan Central	‡E. C. Brown		Bay City, Mich.
Mackinaw & Saginaw Div	W. A. Vaughan		Jackson, Mich.
Main Line & G. R. & Kal. Div's	C. B. Bush		Middleburg, N.Y.
Middleburg & Schoharie	P. S. Demforth		Thompson, Ridge, N.Y
Middletown & Crawford	D. Thompson		Jersey City, N. J
Midland of New Jersey	*H. M. Britton		Fort Hope, Ont.
Midland Railway of Canada	H. G. Taylor		Milwaukee, Wis.
Milwaukee, Lake Shore & West'n	H. G. H. Reed		Mineral Point, Wis.
Mineral Point	G. W. Cobb	G. W. Cobb	Hancock, Mich.
Mineral Range	*C. E. Holland		Minneapolis, Minn
Minneapolis & St. Louis	Chas. F. Hatch	Chas. F. Hatch	Wabasha, Minn.
Minnesota Midland	J. H. Lakey		Memphis, Tenn.
Mississippi & Tennessee	M. Burke	M. Burke	St. Louis, Mo.
Missouri Pacific	A. A. Talmage	R. B. Lyle	St. Louis, Mo.
Missouri Pacific	‡A. W. Dickinson		St. Louis, Mo.
Eastern Division	Miller Bullard		St. Louis, Mo.
Central Branch Division	W. W. Fagan		Sedalia, Mo.
Western Division	Warder Cumming		McAlle, Ala.
Mobile & Alabama Grand Trunk	F. B. Clark, Prest		Mobile, Ala.
Mobile & Ohio	*A. L. Rives	A. L. Rives	Jackson, Tenn.
Northern Division	E. S. Hosford		Mobile, Ala.
Southern Division	C. Fleming		Columbus, Ga.
Mobile & Girard	W. L. Clark		Montgomery, Ala
Mobile & Montgomery	B. Dunha		Mont Alto, Pa.
Mont Alto	G. B. Weistling		Macon, Ga.
Montgomery & Eufaula	W. G. Raoul		Montpelier, Vt.
Montpelier & Wells River	W. A. Stowell		Mauch Chunk, Pa.
Montrose	J. I. Blakslee	J. I. Blakslee	New Orleans, La.
Morgan's Louisiana & Texas	Geo. Pandeley	C. A. Whitney & Co.	Hughesville, Pa.
Muncy Creek	H. R. Mebling		

N

Nashua, Acton & Boston	H. E. Chamberlin		Concord, N. H
Nashua & Lowell	Chas. E. Paige	Chas. E. Paige	Nashua, N. H.
Nashville, Chattanooga & St. Louis	J. W. Thomas		Nashville, Tenn.

Railroad.	Superintendent.	Purchasing Agent.	Residence.
Natchez, Jackson & Columbus	J. H. Fitzpatrick		Natchez, Miss.
Naugatuck	Geo. W. Beach	Geo. W. Beach	Waterbury, Conn.
Nebraska	Wm. Irving		Omaha, Neb.
Nevada Central	*Jos. Collett	F. W. Dunn	Battle Mountain, Nev.
Newburg, Dutchess & Connecticut	C. L. Kimball	C. L. Kimball	Dutchess J'n, N.Y.
New Brunswick & Canada	John Stewart		St. Stephen, N. B.
New Brunswick	E. B. Burpee	T. Burpee	Gibson, N. B.
New Canaan	Wm. St. John		New Canaan, Conn.
New Castle & Franklin	A. Vandivort		New Castle, Pa.
New Haven & Derby	R. S. Quintard		New Haven, Conn.
New Haven & Northampton	C. N. Yeamans	C. N. Yeamans	New Haven, Conn.
New Jersey & New York	J. D. Hasbrouck		Jersey City, N. J.
New Jersey Southern	Rufus Blodgett		110 Lib. st., N. Y.
New Orleans & Selma	T. H. Du Puy		Selma, Ala.
New Orleans, Texas & Mobile	D. B. Robinson	John J. Howell	New Orleans, La.
New York, Lake Erie & Western	*Robert Harris		New York, N. Y.
New York, Lake Erie & Western	E. S. Bowen	J. A. Hardenbergh	New York, N. Y.
New York, Lake Erie & Western	[illegible] O. Chanute		New York, N. Y.
New York, Lake Erie & Western	**P. F. Wright		Jersey City, N. J.
Eastern Division	E. O. Hill		Port Jervis, N. Y.
Delaware Division	Benj. Thomas		Port Jervis, N. Y.
Susquehanna Division	R. B. Cable		Elmira, N. Y.
Buffalo & Rochester Div	R. G. Taylor		Buffalo, N. Y.
Western Division	J. S. Beggs		Dunkirk, N. Y.
New York & Greenwood Lake	Wm. P. Harris		Jersey City, N. J.
New York, New Haven & Hartford	*E. M. Reed	R. N. Dowd	New Haven, Conn.
N. Y. & N. H. Division	John T. Moody		New York, N. Y.
Hartford Division	C. S. Davidson		Hartford, Conn.
Shore Line Division	W. H. Stevenson		New Haven, Conn.
New York Central & Hudson Riv.			
Hudson River & Harlem Div	J. M. Toucey	R. C. Moore	New York, N. Y.
Eastern Division	Zenas C. Priest		Utica, N. Y.
Western Division	Geo. H. Burrows		Rochester, N. Y.
New York Central Division	Jas. Tillinghast		Albany, N. Y.
New York & Harlem	Chas. M. Bissell	R. C. Moore	New York, N. Y.
New York & New England	*Jas. H. Wilson	W. W. McKim	Boston, Mass.
Eastern Division	O. M. Shepard		Boston, Mass.
Norwich Division	P. St. M. Andrews		Norwich, Conn.
Western Division	J. T. McManus		Hartford, Conn.
Providence Division	L. W. Palmer		Providence, R. I.
New York, Ontario & Western	*Theo. Houston		New York, N. Y.
New York, Ontario & Western	N. R. Larkin	Charles Clark	Middletown, N. Y.
Northern Division	C. W. Lanpher		Norwich, N. Y.
Southern Division	A. H. Danforth		Middletown, N. Y.
New York, Penn. & Ohio	P. D. Coverdale	J. H. Holway	Cleveland, O.
First & Second Divisions	A. L. Dunbar		Meadville, Pa.
Third and Fourth Divisions	T. A. Phillips		Galion, O.
Mahoning Division	J. M. Ferris		Cleveland, O.
New York, Providence & Boston	J. B. Gardiner		Providence, R. I.
New York, Providence & Boston		Giles F. Ward	Stonington, Conn.
Northern Pacific	*H. E. Sargent	E. T. Williams	St. Paul, Minn.
Northern Pacific	H. A. Towne		Brainerd, Minn.
Pacific & P. Oreille Div	J. W. Sprague	J. W. Sprague	New Tacoma, W. T.
Missouri Division	D. E. Taylor		Mandon, Dak.
Northern of Canada	*F. W. Cumberland		Toronto, Can.
North Carolina	See Piedmont Air-Line.		
Northern Central	*Frank Thomson		Philadelphia, Pa.
Northern Central		A. W. Sumner	Baltimore, Md.
Baltimore Division	G. C. Wilkins		Baltimore, Md.
Elmira & Canandaigua Div	R. Neilson		Elmira, N. Y.
Susquehanna Division	W. A. Baldwin		Williamsport, Pa.
Northern (New Hampshire)	George F. Todd		Concord, N. H.
Northeastern (Georgia)	Lyman Wells		Athens, Ga.
Northeastern (South Carolina)	J. F. Divine		Charleston, S. C.
North Pacific Coast	W. C. Fillmore	W. F. Russell	San Francisco, Cal.
Northwestern Ohio	J. S. Morris		Toledo, O.
Northern & Northwestern	Jas. Webster		Toronto, Can.

O

Ogdensburg & Lake Champlain	A. Klohs	F. W. Stewart	Malone, N. Y.
Ohio Central	*J. G. Hadley		Columbus, O.
Ohio Central	F. W. Stewart		Toledo, O.
Ohio & Mississippi	W. W. Peabody	G. E. Atwood	Cincinnati, O.
Eastern Division	C. B. Cox		Seymour, Ind.
Western Division	C. M. Stanton		St. Louis, Mo.
Louisville Division	C. Cole		Louisville, Ky.
Old Colony	J. J. R. Kendrick		Boston, Mass.
Northern Division	§S. A. Webber		Fitchburg, Mass.
Cape Cod Division	§C. H. Nye		Hyannis Mass.
Main Line Division	§J. H. French		Boston, Mass.
Olean, Bradford & Warren	J. W. Watson		Olean, N. Y.
Olean Bradford & Warren		J. H. Poole	Buffalo, N. Y.
Omaha & Republican Valley	P. J. Nichols		Omaha, Neb.
Omaha & Northern Nebraska	J. E. Rouse		Omaha, Neb.
Oregon & California	J. Brandt, Jr.	J. Brandt, Jr.	Portland, Oregon.
Oregon Railway & Navigation Co.	G. J. Ainsworth		Portland, Oregon.
Owensboro & Nasaville	E. Culverhouse		Owensboro, Ky.

P

Paducah & Elizabethtown	Robert Meek		Elizabethtown, Ky.
Painesville & Youngstown	**J. A. Newcome		Youngstown, O.
Parker & Karns City	W. C. Moberly		Parker City, Pa.
Peach Bottom	S. M. Manifold		York, Pa.
Paw Paw & Toledo & South Haven	John Hing		Lawton, Mich.
Pennsylvania	*Frank Thomson	Enoch Lewis	Philadelphia, Pa.
Pennsylvania	Charles E. Pugh		Altoona, Pa.
Pennsylvania	**John Reilly		Altoona, Pa.
New York Division	James McCrea		Jersey City, N. J.
Amboy Division	I. S. Buckelew		Camden, N. J.
Belvidere Division	J. A. Anderson		Lambertville, N. J.
New Jersey Division	F. Wolcott Pattenson		Jersey City, N. J.
Philadelphia Division	W. F. Lockard		Philadelphia, Pa.
Middle Division	S. M. Prevost		Harrisburg, Pa.
Pittsburg Division	Robert Pitcairn		Pittsburg, Pa.
Tyrone Division	S. S. Blair		Tyrone, Pa.
Bedford Division	Thos. A. Roberts		Harrisburg, Pa.
West Pennsylvania Division	E. B. Taylor		Allegheny City, Pa.
Lewistown Division	J. B. Hutchinson		Lewistown, Pa.
Pensacola & Selma	W. D. Chipley		Pensacola, Fla.
Peoria, Decatur & Evansville	G. R. Cobleigh	G. R. Cobleigh	Peoria, Ill.
Peoria & Jacksonville	*Geo. Skinner	Geo. Skinner	Peoria, Ill.
Peoria & Springfield	J. R. Hilliard		Peoria, Ill.
Petersburg	R. Sully	L. E. Clark	Petersburg, Va.
Philadelphia & Atlantic City	Ellis Clark	Ellis Clark	Philadelphia, Pa.
Philadelphia & Reading	*J. E. Wootten	W. S. Wilson	Philadelphia, Pa.
Catawissa & Williamsport Br.	D. C. Reinhart		Williamsport, Pa.
Reading & Columbia	Alex. M. Wilson		Columbia, Pa.
Lebanon & Tremont	H. W. Tracy		Pine Grove, Pa.
N. Penn. & H. Brook Div's'n.	E. A. Sweigard		Philadelphia, Pa.
Philadelphia & Baltimore Central	Henry Wood	Henry Wood	Philadelphia, Pa.
Philadelphia & Erie	Wm. A. Baldwin		Williamsport, Pa.
Philadelphia & Erie		Enoch Lewis	Philadelphia, Pa.
Western Division	J. W. Reynolds		Erie, Pa.
Middle Division	E. B. Westfall		Renovo, Pa.
Eastern Division	Thomas Gucker		Williamsport, Pa.
Dany., Haz. & W. Barre Div	Joseph Crawford		Sunbury, Pa.
Philadelphia, Wilmington & Balt	H. F. Kenney		Philadelphia, Pa.
Philadelphia, Newt'n & New York	L. L. Bush		Philadelphia, Pa.
Piedmont Air-Line	T. M. R. Talcott	R. H. Duesberry	Richmond, Va.
Richmond & Danville Div	W. A. Green		Richmond, Va.

Railroad.	Superintendent.	Purchasing Agent.	Residence.
North Carolina Division	A. B. Andrews		Raleigh, N. C.
Pine River Valley & Stevens Pt	N. L. James		Richl'nd Cent., Wis.
Pittsburg & Castle Shannon	A. C. Hays		Pittsburg, Pa.
Pittsburg & Lake Erie	R. W. Jones		Pittsburg, Pa.
Pittsburg, Cincinnati & St. Louis	S. M. Felton, Jr.	William Mullins	Pittsburg, Pa.
Pittsburg, Cincinnati & St. Louis	*D. W. Caldwell		Pittsburg, Pa.
Pitts., Cin. & St. Louis Div	J. H. Barrett		Pittsburg, Pa.
Col., Cin. & Ind., Cent. Div	J. T. Bacon		Logansport, Ind.
Col., Cin. & Ind., Cent. Div	J. F. Miller		Richmond, Ind.
Indianap. & Vincennes Div	E. W. McKenna		Indianapolis, Ind.
Cincin. & Musk. Valley Div	C. C. Waite		Zanesville, O.
Little Miami Div	J. D. Ellison		Cincinnati, O.
Pittsburg, Ft. Wayne & Chicago	*J. D. Layng	William Mullins	Pittsburg, Pa.
Pittsburg, Ft. Wayne & Chicago	‡C. E. Gorham		Chicago, Ill.
Eastern Division	George S. Griscom		Columbus, O.
Western Division	C. D. Gorham		Fort Wayne, Ind.
Pittsburg & Western	J. A. Bonner		Harmony, Pa.
Pittsburg, Titusville & Buffalo	Tho. H. Wilson		Oil City, Pa.
Pittsburg, Titusville & Buffalo		John L. Awl	Pittsburg, Pa.
Pittsburg, Virginia & Charleston	J. M. Byers		Pittsburg, Pa.
Port Dover & Lake Huron	A. B. Atwater		Woodstock, Ont.
Port Royal & Augusta	R. G. Fleming		Port Royal, S. C.
Portland & Ogdensburg	Jonas Hamilton	Jonas Hamilton	Portland, Me.
Portland & Rochester	G. P. Wescott, *Rec.		Portland, Me.
Potomac, Fredericksb'h & Pied't	Charles Kennedy		Fredericksb'h, Va.
Poughkeepsie, Hartford & Boston	J. A. Perkins	A. W. Cable	Poughkeepsie, N. Y.
Prince Edward Island	L. B. Archibald	L. B. Archibald	Charlotte'n, P.E.I.
Prospect Park & Coney Island	R. Schermerhorn		Coney Island, N.Y.
Providence & Springfield	William Tinkham	William Tinkham	Providence, R. I.
Providence & Worcester	W. E. Chamberlain		Providence, R. I.
Providence, Warren & Bristol	Waterman Stone		Providence, R. I.

Q

Quebec, Mont., Ott'a & Occidental	L. A. Senecal	W. E. Blumhart	Montreal, Can.
Quebec Central	§A. Steele		Sherbrooke, Can.
Queen Anne & Kent County	F. H. Irwin		Centreville, Md.
Quincy, Missouri & Pacific	F. D. Schermerhorn		Quincy, Ill.

R

Raleigh & Augusta Air-Line	J. C. Winder		Raleigh, N. C.
Raleigh & Gaston	J. C. Winder		Raleigh, N. C.
Rhinebeck & Connecticut	J. H. Jones		Rondout, N. Y.
Richmond, York Riv. & Chesap'k	H. T. Douglas	B. S. Crouch	Richmond, Va.
Richmond & Allegheny	*Decatur Axtell		Richmond, Va.
Richmond & Danville	(See Piedmont Air-Line).		
Richmond, Frederick'h & Potomac	E. T. D. Myers	T. L. Courtney	Richmond, Va.
Richmond & Petersburg	Theo. D. Kline		Richmond, Va.
Rio Grande	*M. J. Gomila		Brownsville, Tex.
Rochester & State Line	H. Clay Evans	J. E. Childs	Rochester, N. Y.
Rockwood & Tennessee River	H. Clay Evans		Rockwood, Tenn.
Rock Island & Mercer County	*R. R. Cable		Rock Island, Ill.
Rock Island & Peoria	R. R. Cable	R. R. Cable	Rock Island, Ill.
Rome	Eben Hillyer		Rome, Ga.
Rome, Watertown & Ogdensburg	E. A. Van Horne		Watertown, N. Y.
Rome, Watertown & Ogdensburg		G. W. B. Cushing	New York City.
Rumford & Buckfield	O. Hayford		Canton, Me.

S

Scioto Valley	Joseph Robinson		Columbus, O.
Sciota Valley		C. H. Cory	Portsmouth, O.
St. Croix & Penobscot	Wallace Haycock		Milltown, Me.
St. Lawrence & Ottawa	*Tho. Reynolds	Tho. Reynolds	Ottawa, Can.
St. Johns	R. McLaughlin		Jacksonville, Fla.
St. Johns & Indian River	W. H. Churchill		Titusville, Fla.
St. John & Maine	H. D. McLeod		St. John, N. B.
St. Johnsbury & Lake Champlain	A. B. Jewett		St. Johnsbury, Vt.
St. Joseph & Des Moines	J. F. Barnard		St. Joseph, Mo.
St. Joseph & Western	L. D. Tuthill		St. Joseph, Mo.
St. Joseph & Western		A. D. Clarke	Omaha, Neb.
St. Louis, Alton & Terre Haute	Beriah Warren	Beriah Warren	St. Louis, Mo.
St. Louis, Hannibal & Keokuk	W. W. Walker		Hannibal, Mo.
St. Louis, Iron Mountain & South	Arthur W. Soper	W. S. Cuddy	St. Louis, Mo.
Texas Division	J. W. Brown		Texarkana, Texas
Missouri Division	Wm. Kerrigan		St. Louis, Mo.
St. Louis & San Francisco	*C. W. Rogers	A. G. Thompson	St. Louis, Mo.
Kansas Division	W. A. Thoms		Neodesha, Kan.
St. Louis, Keokuk & Northwest'n	A. L. Griffin	John A. Blood	Keokuk, Ia.
St. Louis, Salem & Little Rock	E. B. Sankey		Salem, Mo.
St. Louis, Salem & Little Rock		H. A. Crawford	St. Louis, Mo.
St. Louis Bridge Co. & Tunnel R. R.	J. B. Van Dyne	J. E. Williams, Jr.	St. Louis, Mo.
St. Paul & Duluth	Geo. H. Smith		St. Paul, Minn.
St. Paul, Minneapolis & Manitoba	*Jas. J. Hill	J. C. Morrison	St. Paul, Minn.
St. Paul, Minneapolis & Manitoba	E. B. Wakeman		St. Paul, Minn.
St. Paul & Sioux City	E. W. Winter		St. Paul, Minn.
Sacramento & Placerville	Josiah Johnson		Sacramento, Cal.
Saginaw Valley & St. Louis	N. W. Merrill	N. W. Merrill	Saginaw, Mich.
San Francisco & North Pacific	H. C. Whiting	P. E. Dougherty	San Francisco, Cal.
San Rafael & San Quentin	David Nye		San Rafael, Cal.
Savannah, Florida & Western	*H. S. Haines	W. B. McKee	Savannah, Ga.
Savannah & Memphis	*G. J. Foreacre		Atlanta, Ga.
Seaboard & Roanoke	J. M. Robinson	J. A. Walton	Baltimore, Md.
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South Mountain	W. H. Woodward		Pine Grove Furnace, Pa.
Southern Pacific	A. C. Bassett	John R. Watson	San Francisco, Cal.
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Tulare Division	A. D. Wilder		Oakland, Cal.
South Pacific Coast	F. W. Bowen		San Francisco, Cal.
Southwestern of Georgia	W. G. Raoul		Macon, Ga.
Southwestern of Kentucky	M. Tabler		Harrodsburg, Ky.
Spartanburg, Union & Columbia	Jas. Anderson	Jas. Anderson	Spartanburg, S. C.
Spartanburg & Asheville	Jas. Anderson	Jas. Anderson	Spartanburg, S. C.
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Springfield Southern	Wm. Thornburg	G. A. Barnes	Springfield, O.
Springhill & Parsboro	J. A. Killam		Parsboro, N. S.
State Line & Sullivan	J. O. Bright		Towanda, Pa.
Staten Island	John W. Wilber		Tottenville, N. Y.
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Summit Branch	R. C. Peebles		Lykens, Pa.
Summit County	W. M. Riter		Coalville, Utah.
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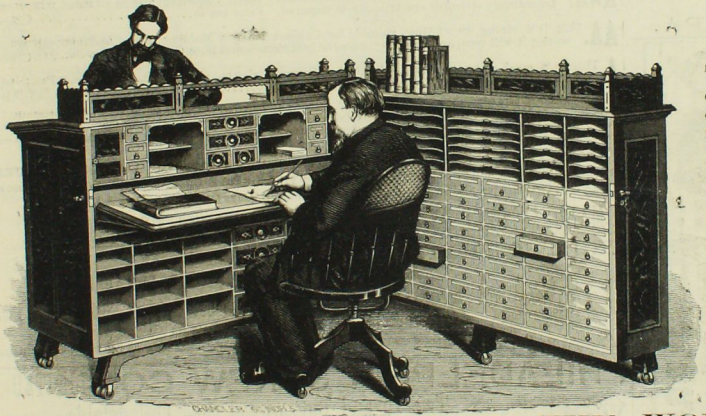

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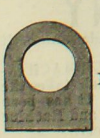

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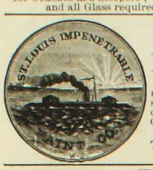

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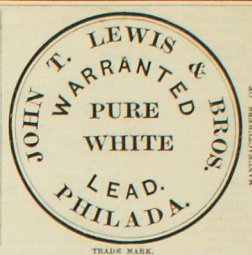

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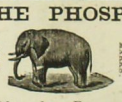
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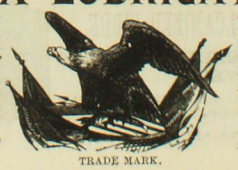
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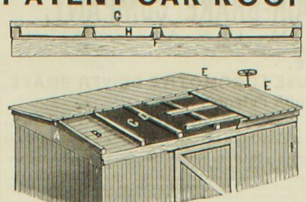

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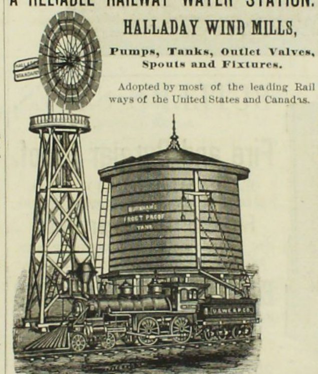

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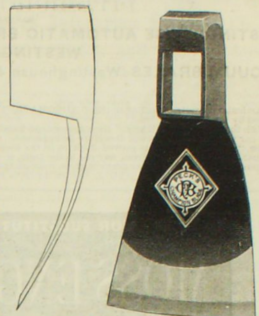

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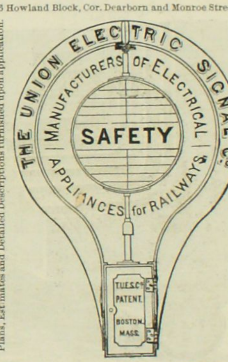

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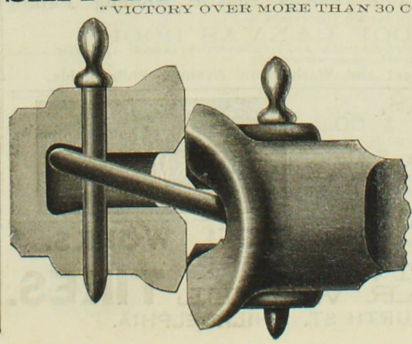

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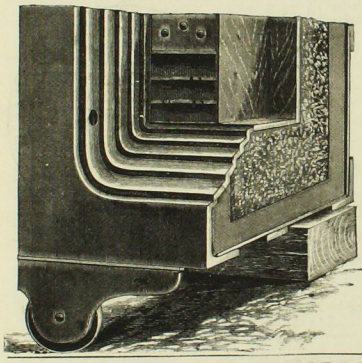

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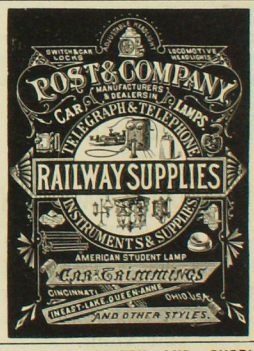

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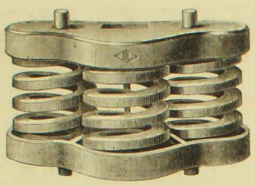

WIDTH, - - - - - - 11½ INCHES
HEIGHT, - - - - - - 6¼ INCHES
WEIGHT, - - - - - - 40 POUNDS
CAPACITY OF EACH SPRING, 18,000 POUNDS

REPRESENTED BY
CURRAN DINSMORE,
AND
CHARLES D'W. GIBSON,
NO. 5 DEY ST., NEW YORK.

NATIONAL
Car Spring Company,

RICHARD VOSE, President.

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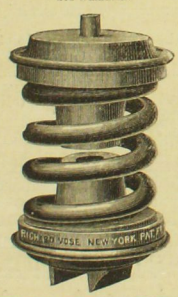
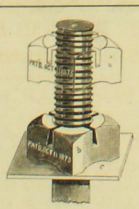


Adapted to a Car-Body Weighing 32,000 Lbs. Diameter, outside Casting, 8 in. Height, Bearing to Bearing, 11¼ in.

Atwood Safety Nut Co.,

Springfield, Mass.



J. W. LARABEE, Treasurer.

a, ATWOOD NUT on bolt without bearing on base—slots open. *b*, ATWOOD NUT turned to bearing *c*, partially closing the slots and grasping the bolt.

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Railway Car Springs,

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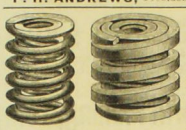

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FROM BEST CAST STEEL,

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ALEX DE LANO, Treasurer and Manager.
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DETROIT, MICH.
A. H. KING, General Eastern Sales Agent.
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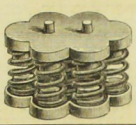

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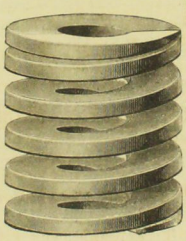

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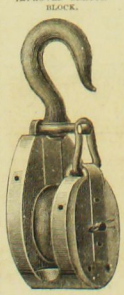

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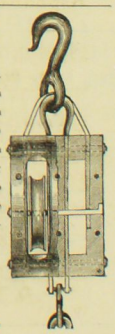

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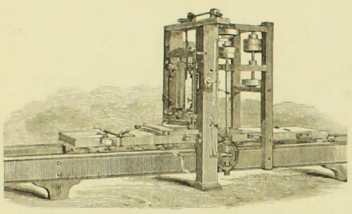

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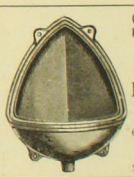

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